

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Thr | Thr | Ala | Ala | Val | Ile | Ser | Ala | Leu | Cys | Phe | Leu | Val | Leu | Ala |
| 290 | | | | | | | | | | | | | | | |
| 295 | | | | | | | | | | | | | | 300 | |
| Val | Phe | Ala | Gly | Gly | Thr | Leu | Gly | Val | Tyr | Asn | Tyr | Val | Gly | Leu | Asn |
| 305 | | | | | | | | | | | | | | | 320 |
| | | | | | | | | | | | | | | | |
| Leu | Leu | Ala | Ser | Val | Gly | Leu | Val | Phe | Val | Tyr | Phe | Ala | Leu | Val | Gly |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 335 | |
| 325 | | | | | | | | | | | | | | | |
| Leu | Leu | Ile | Ala | Gly | Ile | Asp | Lys | Leu | Arg | Asn | Pro | Val | Glu | Val | Lys |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 350 | |
| 340 | | | | | | | | | | | | | | | |
| Ser | Val | Lys | Ala | Val | Ala | Val | Val | Glu | Pro | Glu | Pro | Glu | Glu | Val | Glu |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 365 | |
| 355 | | | | | | | | | | | | | | | |
| Glu | Asp | Glu | Glu | Glu | His | Val | Glu | Glu | Glu | Val | Asp | Glu | Glu | Glu | Glu |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 380 | |
| 370 | | | | | | | | | | | | | | | |
| Glu | Val | Glu | Glu | Gly | Val | Glu | Glu | Val | Glu | Glu | Asp | Asp | Ala | Glu | Asp |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 400 | |
| 385 | | | | | | | | | | | | | | | |
| Pro | Glu | Glu | Asn | Pro | Glu | Glu | Glu | Glu | Ser | Asp | Glu | Glu | Ile | Glu | Thr |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 415 | |
| 405 | | | | | | | | | | | | | | | |
| Glu | Thr | Glu | Ala | Glu | Glu | Thr | Asn | Asp | Gly | Ser | Glu | Ala | Glu | Asp | Arg |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 430 | |
| 420 | | | | | | | | | | | | | | | |
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<210> 1097

<211> 603

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(580)

<223> RXC02665

<400> 1097

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atcaccgcacg aagccgaacc cacaatattt gaggtaccag gtg act aac cca atc 115
Val Thr Asn Pro Ile
1 5atc ccc cgc gta gga atc gcc aca gac gcc cac caa atc gaa gcg gga 163
Ile Pro Arg Val Gly Ile Ala Thr Asp Ala His Gln Ile Glu Ala Gly
10 15 20aaa ccc tgc tgg atc gcc tgc ctc ctc ttt gaa ggc gtc gac ggc tgc 211
Lys Pro Cys Trp Ile Ala Cys Leu Leu Phe Glu Gly Val Asp Gly Cys
25 30 35gaa ggc cac tcc gac ggt gat gtt gta gct cat gca att gtg gat gct 259
Glu Gly His Ser Asp Gly Asp Val Val Ala His Ala Ile Val Asp Ala
40 45 50

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------|------------|-----|-----|-----|-----|
| ctc | ctt | tct | gcc | tct | ggt | ctg | ggg | gat | ttg | ggc | tct | ttc | gtt | ggt | gtg | 307 |
| Leu | Leu | Ser | Ala | Ser | Gly | Leu | Gly | Asp | Leu | Gly | Ser | Phe | Val | Gly | Val | |
| 55 | | | | | | | | | | | | | | 65 | | |
| ggg | aga | cct | gaa | tac | gat | ggt | gtt | tct | ggt | aca | cag | ttg | ttg | aag | gaa | 355 |
| Gly | Arg | Pro | Glu | Tyr | Asp | Gly | Val | Ser | Gly | Thr | Gln | Leu | Leu | Lys | Glu | |
| 70 | | | | | | | | | | | | | | 85 | | |
| gtt | cgg | gag | ctg | ctt | tcg | gca | cac | ggg | tac | gtc | att | gga | aat | gtc | gcc | 403 |
| Val | Arg | Glu | Leu | Leu | Ser | Ala | His | Gly | Tyr | Val | Ile | Gly | Asn | Val | Ala | |
| 90 | | | | | | | | | | | | | | 100 | | |
| gcc | caa | ctg | gtt | ggc | caa | acc | ccc | aaa | ttt | gga | ccc | cgc | cgc | gaa | gaa | 451 |
| Ala | Gln | Leu | Val | Gly | Gln | Thr | Pro | Lys | Phe | Gly | Pro | Arg | Arg | Glu | Glu | |
| 105 | | | | | | | | | | | | | | 115 | | |
| gca | caa | caa | gtc | atc | tcc | gaa | atc | atc | ggc | gca | cca | tgc | tca | ctg | tct | 499 |
| Ala | Gln | Gln | Val | Ile | Ser | Glu | Ile | Ile | Gly | Ala | Pro | Cys | Ser | Leu | Ser | |
| 120 | | | | | | | | | | | | | | 130 | | |
| gcc | acc | acc | act | gat | cac | atg | gga | ttc | act | ggt | cgc | agc | gag | ggt | cgt | 547 |
| Ala | Thr | Thr | Asp | His | Met | Gly | Phe | Thr | Gly | Arg | Ser | Glu | Gly | Arg | | |
| 135 | | | | | | | | | | | | | | 145 | | |
| gca | tcg | gta | gca | acg | gca | gtg | gtg | tgg | aag | gct | taagtttct | gtagggattg | | | 600 | |
| Ala | Ser | Val | Ala | Thr | Ala | Val | Val | Trp | Lys | Ala | | | | | | |
| 150 | | | | | | | | | | | | | | 160 | | |
| ggc | | | | | | | | | | | | | | | 603 | |

<210> 1098

<211> 160

<212> PRT

<213> Corynebacterium glutamicum

<400> 1098

Val Thr Asn Pro Ile Ile Pro Arg Val Gly Ile Ala Thr Asp Ala His

1

5

10

15

Gln Ile Glu Ala Gly Lys Pro Cys Trp Ile Ala Cys Leu Leu Phe Glu

20

25

30

Gly Val Asp Gly Cys Glu Gly His Ser Asp Gly Asp Val Val Ala His

35

40

45

Ala Ile Val Asp Ala Leu Leu Ser Ala Ser Gly Leu Gly Asp Leu Gly

50

55

60

Ser Phe Val Gly Val Gly Arg Pro Glu Tyr Asp Gly Val Ser Gly Thr

65

70

75

80

Gln Leu Leu Lys Glu Val Arg Glu Leu Leu Ser Ala His Gly Tyr Val

85

90

95

Ile Gly Asn Val Ala Ala Gln Leu Val Gly Gln Thr Pro Lys Phe Gly

100

105

110

Pro Arg Arg Glu Glu Ala Gln Gln Val Ile Ser Glu Ile Ile Gly Ala

115

120

125

Pro Cys Ser Leu Ser Ala Thr Thr Thr Asp His Met Gly Phe Thr Gly
 130 135 140

Arg Ser Glu Gly Arg Ala Ser Val Ala Thr Ala Val Val Trp Lys Ala
 145 150 155 160

<210> 1099

<211> 1689

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (101)..(1666)

<223> RXC02770

<400> 1099

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ttcacacatg ttgtttcgga agtcacgcag cgccgttaatc atg ttg gtt gca gcg 115
 Met Leu Val Ala Ala
 1 5

tta gtg atg aca agc tgt ggt gat ggg gaa ccg gaa cca acc agc cac 163
 Leu Val Met Thr Ser Cys Gly Asp Gly Glu Pro Glu Pro Thr Ser His
 10 15 20

caa aca agc ctt ttc ggc tac gca gtt aac tct tcg ctg gct aca acc 211
 Gln Thr Ser Leu Phe Gly Tyr Ala Val Asn Ser Ser Leu Ala Thr Thr
 25 30 35

aac gcg gcg tcg ctg ttg gga gtg gct aat gat gct ggt ctt ttg gct 259
 Asn Ala Ala Ser Leu Leu Gly Val Ala Asn Asp Ala Gly Leu Leu Ala
 40 45 50

gcc aga gtg tat ccg ggt gtg tat gtt cag ggt cct tct ggg cag atg 307
 Ala Arg Val Tyr Pro Gly Val Tyr Val Gln Gly Pro Ser Gly Gln Met
 55 60 65

att ccc aac act gat ctt gct tcc acg cag gta ttg ccg ggt att aac 355
 Ile Pro Asn Thr Asp Leu Ala Ser Thr Gln Val Leu Pro Gly Ile Asn
 70 75 80 85

cgc cag gtg att tac act atc aat gaa gat gcc acc tac tca gat ggt 403
 Arg Gln Val Ile Tyr Thr Ile Asn Glu Asp Ala Thr Tyr Ser Asp Gly
 90 95 100

cag cct gtg gtg tgt gat gat ttt ctg ctc tct gcg aca gct ggg cag 451
 Gln Pro Val Val Cys Asp Asp Phe Leu Leu Ser Ala Thr Ala Gly Gln
 105 110 115

atg ccg gaa ctg ttc cag tcc cat gtg cca ttg acc tcg cag att gag 499
 Met Pro Glu Leu Phe Gln Ser His Val Pro Leu Thr Ser Gln Ile Glu
 120 125 130

cga gtg gac tgt gta tct ggt tct aaa gta gcc acc gtg gtg ttc aag 547
 Arg Val Asp Cys Val Ser Gly Ser Lys Val Ala Thr Val Val Phe Lys

| 135 | 140 | 145 | |
|--|-----|-----|-----|
| gaa gac ctc ggt gag cgt tgg cgt tat ctt ttt gag cag ggc gat ttg Glu Asp Leu Gly Glu Arg Trp Arg Tyr Leu Phe Glu Gln Gly Asp Leu | 150 | 155 | 595 |
| 160 | | 165 | |
| ttg cca gcc cat gcc gtt gct tcc aaa gca ggt atg acc ttg gag gag Leu Pro Ala His Ala Val Ala Ser Lys Ala Gly Met Thr Leu Glu Glu | 170 | 175 | 643 |
| 180 | | | |
| ctt aat cag gcg ttg aag gat aag gat cct gaa gcg ttg act gaa cct Leu Asn Gln Ala Leu Lys Asp Lys Asp Pro Glu Ala Leu Thr Glu Pro | 185 | 190 | 691 |
| 195 | | | |
| gct cgt gtg tgg agc gaa ggt ttc cag ctg tcc cag ttt gat cca gag Ala Arg Val Trp Ser Glu Gly Phe Gln Leu Ser Gln Phe Asp Pro Glu | 200 | 205 | 739 |
| 210 | | | |
| ctg cag acg gct ttt ggc ccg tac aag gtg gat tct gtg ggt gaa ttc Leu Gln Thr Ala Phe Gly Pro Tyr Lys Val Asp Ser Val Gly Glu Phe | 215 | 220 | 787 |
| 225 | | | |
| ggc gaa gtc aag ctg gta cgc aat gag ttt tac agt ggc gac cag gcg Gly Glu Val Lys Leu Val Arg Asn Glu Phe Tyr Ser Gly Asp Gln Ala | 230 | 235 | 835 |
| 240 | | 245 | |
| gtt gaa gca gaa atc acg atg tgg cct aaa ggc tcg gat ctc agc gcc Val Glu Ala Glu Ile Thr Met Trp Pro Lys Gly Ser Asp Leu Ser Ala | 250 | 255 | 883 |
| 260 | | | |
| att gcg gat aat gga aac ctt cag atc gca cat gtt gtg gcg tgg gag Ile Ala Asp Asn Gly Asn Leu Gln Ile Ala His Val Val Ala Trp Glu | 265 | 270 | 931 |
| 275 | | | |
| agc gag ccg tgg gta aat cgc gat gac cca ttg aat cct tat gac att Ser Glu Pro Trp Val Asn Arg Asp Asp Pro Leu Asn Pro Tyr Asp Ile | 280 | 285 | 979 |
| 290 | | | |
| aag gaa gag gtc ggt gtt ttg act gag cag ctc acc ttg gcc agt gcc 1027 | | | |
| Lys Glu Glu Val Gly Val Leu Thr Glu Gln Leu Thr Leu Ala Ser Ala | 295 | 300 | 305 |
| 305 | | | |
| ggt gtg ttt tac gct gcg gag gcc cgg cag gcg ttt gcg gcc tgc gtt 1075 | | | |
| Gly Val Phe Tyr Ala Ala Glu Ala Arg Gln Ala Phe Ala Ala Cys Val | 310 | 315 | 320 |
| 325 | | | |
| gac cag gaa gcg gtg gct gcg gcg tcg tca agc atc tct gga atc gat 1123 | | | |
| Asp Gln Glu Ala Val Ala Ala Ser Ser Ser Ile Ser Gly Ile Asp | 330 | 335 | 340 |
| 340 | | | |
| gtg cct gcc gta ggt gtg cac tcg gtg cgt cac caa aat ccg gtc gtg 1171 | | | |
| Val Pro Ala Val Gly Val His Ser Val Arg His Gln Asn Pro Val Val | 345 | 350 | 355 |
| 355 | | | |
| cac caa atc ggt gat ctg cca gca cag cac atg gcg gtg gat att aat 1219 | | | |
| His Gln Ile Gly Asp Leu Pro Ala Gln His Met Ala Val Asp Ile Asn | | | |

360

365

370

gcc gca tca gcg ttg gcg ggt caa tcc atc cgc att ggc tac gac gga
 1267

Ala Ala Ser Ala Leu Ala Gly Gln Ser Ile Arg Ile Gly Tyr Asp Gly
 375 380 385

ccc gat gag cgc aag gct gca atg gtg gag gcg att cgc caa agt tgt
 1315

Pro Asp Glu Arg Lys Ala Ala Met Val Glu Ala Ile Arg Gln Ser Cys
 390 395 400 405

gag cct gcc ggt atc acc gtt atc gat gcg tcg cag gag gct gtt agt
 1363

Glu Pro Ala Gly Ile Thr Val Ile Asp Ala Ser Gln Glu Ala Val Ser
 410 415 420

ctt aat gat ctc agt cga acc gaa gtc agt gaa tgg ggc tat gag cag
 1411

Leu Asn Asp Leu Ser Arg Thr Glu Val Ser Glu Trp Gly Tyr Glu Gln
 425 430 435

tac ttc gaa ggg aca ctt gac gct gtt ctg cgt aca gtg gat cca cat
 1459

Tyr Phe Glu Gly Thr Leu Asp Ala Val Leu Arg Thr Val Asp Pro His
 440 445 450

cgg gag tat gaa aat gcc aat acc att gga act gat gcg gag tcg acg
 1507

Arg Glu Tyr Glu Asn Ala Asn Thr Ile Gly Thr Asp Ala Glu Ser Thr
 455 460 465

agg cgc act gaa gaa caa ttg tgg gct gaa gtc cca tca att cca cta
 1555

Arg Arg Thr Glu Glu Gln Leu Trp Ala Glu Val Pro Ser Ile Pro Leu
 470 475 480 485

gca gcg caa ccc cga gtg ttt gtg ata gat cgc aca gtc ggt aac gtt
 1603

Ala Ala Gln Pro Arg Val Phe Val Ile Asp Arg Thr Val Gly Asn Val
 490 495 500

gtt gtt aat aca gac cta gcc ggt atc gga tgg aac atg gac cgt tgg
 1651

Val Val Asn Thr Asp Leu Ala Gly Ile Gly Trp Asn Met Asp Arg Trp
 505 510 515

tcc aga agt gag gaa taagtagtga gcgaacaagc tct

1689

Ser Arg Ser Glu Glu
 520

<210> 1100

<211> 522

<212> PRT

<213> Corynebacterium glutamicum

<400> 1100

Met Leu Val Ala Ala Leu Val Met Thr Ser Cys Gly Asp Gly Glu Pro
 1 5 10 15

Glu Pro Thr Ser His Gln Thr Ser Leu Phe Gly Tyr Ala Val Asn Ser
 20 25 30
 Ser Leu Ala Thr Thr Asn Ala Ala Ser Leu Leu Gly Val Ala Asn Asp
 35 40 45
 Ala Gly Leu Leu Ala Ala Arg Val Tyr Pro Gly Val Tyr Val Gln Gly
 50 55 60
 Pro Ser Gly Gln Met Ile Pro Asn Thr Asp Leu Ala Ser Thr Gln Val
 65 70 75 80
 Leu Pro Gly Ile Asn Arg Gln Val Ile Tyr Thr Ile Asn Glu Asp Ala
 85 90 95
 Thr Tyr Ser Asp Gly Gln Pro Val Val Cys Asp Asp Phe Leu Leu Ser
 100 105 110
 Ala Thr Ala Gly Gln Met Pro Glu Leu Phe Gln Ser His Val Pro Leu
 115 120 125
 Thr Ser Gln Ile Glu Arg Val Asp Cys Val Ser Gly Ser Lys Val Ala
 130 135 140
 Thr Val Val Phe Lys Glu Asp Leu Gly Glu Arg Trp Arg Tyr Leu Phe
 145 150 155 160
 Glu Gln Gly Asp Leu Leu Pro Ala His Ala Val Ala Ser Lys Ala Gly
 165 170 175
 Met Thr Leu Glu Glu Leu Asn Gln Ala Leu Lys Asp Lys Asp Pro Glu
 180 185 190
 Ala Leu Thr Glu Pro Ala Arg Val Trp Ser Glu Gly Phe Gln Leu Ser
 195 200 205
 Gln Phe Asp Pro Glu Leu Gln Thr Ala Phe Gly Pro Tyr Lys Val Asp
 210 215 220
 Ser Val Gly Glu Phe Gly Glu Val Lys Leu Val Arg Asn Glu Phe Tyr
 225 230 235 240
 Ser Gly Asp Gln Ala Val Glu Ala Glu Ile Thr Met Trp Pro Lys Gly
 245 250 255
 Ser Asp Leu Ser Ala Ile Ala Asp Asn Gly Asn Leu Gln Ile Ala His
 260 265 270
 Val Val Ala Trp Glu Ser Glu Pro Trp Val Asn Arg Asp Asp Pro Leu
 275 280 285
 Asn Pro Tyr Asp Ile Lys Glu Glu Val Gly Val Leu Thr Glu Gln Leu
 290 295 300
 Thr Leu Ala Ser Ala Gly Val Phe Tyr Ala Ala Glu Ala Arg Gln Ala
 305 310 315 320
 Phe Ala Ala Cys Val Asp Gln Glu Ala Val Ala Ala Ala Ser Ser Ser
 325 330 335

Ile Ser Gly Ile Asp Val Pro Ala Val Gly Val His Ser Val Arg His
 340 345 350
 Gln Asn Pro Val Val His Gln Ile Gly Asp Leu Pro Ala Gln His Met
 355 360 365
 Ala Val Asp Ile Asn Ala Ala Ser Ala Leu Ala Gly Gln Ser Ile Arg
 370 375 380
 Ile Gly Tyr Asp Gly Pro Asp Glu Arg Lys Ala Ala Met Val Glu Ala
 385 390 395 400
 Ile Arg Gln Ser Cys Glu Pro Ala Gly Ile Thr Val Ile Asp Ala Ser
 405 410 415
 Gln Glu Ala Val Ser Leu Asn Asp Leu Ser Arg Thr Glu Val Ser Glu
 420 425 430
 Trp Gly Tyr Glu Gln Tyr Phe Glu Gly Thr Leu Asp Ala Val Leu Arg
 435 440 445
 Thr Val Asp Pro His Arg Glu Tyr Glu Asn Ala Asn Thr Ile Gly Thr
 450 455 460
 Asp Ala Glu Ser Thr Arg Arg Thr Glu Glu Gln Leu Trp Ala Glu Val
 465 470 475 480
 Pro Ser Ile Pro Leu Ala Ala Gln Pro Arg Val Phe Val Ile Asp Arg
 485 490 495
 Thr Val Gly Asn Val Val Val Asn Thr Asp Leu Ala Gly Ile Gly Trp
 500 505 510
 Asn Met Asp Arg Trp Ser Arg Ser Glu Glu
 515 520

<210> 1101
 <211> 408
 <212> DNA
 <213> *Corynebacterium glutamicum*

<220>
 <221> CDS
 <222> (101)..(385)
 <223> RXC02238

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 ctcttaacac tactgtccat atactttga aaagggtgtca gtg acc aac gtg agc 115
 Val Thr Asn Val Ser
 1 5

aac gag acc aac gcc acc aag gcc gtc ttc gat ccg cca gtg ggc att 163
 Asn Glu Thr Asn Ala Thr Lys Ala Val Phe Asp Pro Pro Val Gly Ile
 10 15 20

acc gct cct ccg atc gat gaa ctg ctg gat aag gtc act tcc aag tac 211
 Thr Ala Pro Pro Ile Asp Glu Leu Leu Asp Lys Val Thr Ser Lys Tyr
 25 30 35

gcc ctc gtg atc ttc gca gcc aag cgt gcg cgc cag atc aac agc agc ttc 259
 Ala Leu Val Ile Phe Ala Ala Lys Arg Ala Arg Gln Ile Asn Ser Phe
 40 45 50

tac cat cag gca gat gag gga gta ttc gag ttc atc gga cca ttg gtt 307
 Tyr His Gln Ala Asp Glu Gly Val Phe Glu Phe Ile Gly Pro Leu Val
 55 60 65

act ccg cag cca ggc gaa aag cca ctt tct att gct ctg cgt gag atc 355
 Thr Pro Gln Pro Gly Glu Lys Pro Leu Ser Ile Ala Leu Arg Glu Ile
 70 75 80 85

aat gca ggt ctg ttg gac cac gag gaa ggt taaaagacct tataacttca 405
 Asn Ala Gly Leu Leu Asp His Glu Glu Gly
 90 95

cac 408

<210> 1102
 <211> 95
 <212> PRT
 <213> Corynebacterium glutamicum

<400> 1102
 Val Thr Asn Val Ser Asn Glu Thr Asn Ala Thr Lys Ala Val Phe Asp
 1 5 10 15

Pro Pro Val Gly Ile Thr Ala Pro Pro Ile Asp Glu Leu Leu Asp Lys
 20 25 30

Val Thr Ser Lys Tyr Ala Leu Val Ile Phe Ala Ala Lys Arg Ala Arg
 35 40 45

Gln Ile Asn Ser Phe Tyr His Gln Ala Asp Glu Gly Val Phe Glu Phe
 50 55 60

Ile Gly Pro Leu Val Thr Pro Gln Pro Gly Glu Lys Pro Leu Ser Ile
 65 70 75 80

Ala Leu Arg Glu Ile Asn Ala Gly Leu Leu Asp His Glu Glu Gly
 85 90 95

<210> 1103
 <211> 1298
 <212> DNA
 <213> Corynebacterium glutamicum

<220>
 <221> CDS
 <222> (1)..(1275)
 <223> RXC01946

<400> 1103
 atc cgc aag tac tcc agg ctc gag gaa caa ttc cag tcg ctc ggc ggc 48
 Ile Arg Lys Tyr Ser Arg Leu Glu Glu Gln Phe Gln Ser Leu Gly Gly
 1 5 10 15

tac gaa gct gac gcc gaa gca gcc cag atc tgc gac aac ctc ggc ctc 96

| | | |
|---|-----|-----|
| Tyr Glu Ala Asp Ala Glu Ala Ala Gln Ile Cys Asp Asn Leu Gly Leu | | |
| 20 | 25 | 30 |
| gag gca cgc atc ctc gac cag cag ctt aaa acc ctg tcc ggc ggc cag | | 144 |
| Glu Ala Arg Ile Leu Asp Gln Gln Leu Lys Thr Leu Ser Gly Gly Gln | | |
| 35 | 40 | 45 |
| cgc cgc cgc gtc gag ttg gcg cag atc ctc ttc gcc gcc acc aac ggc | | 192 |
| Arg Arg Arg Val Glu Leu Ala Gln Ile Leu Phe Ala Ala Thr Asn Gly | | |
| 50 | 55 | 60 |
| tcc ggc aaa tca aaa acc aca ttg ctt ctc gac gag ccc acc aac cac | | 240 |
| Ser Gly Lys Ser Lys Thr Thr Leu Leu Leu Asp Glu Pro Thr Asn His | | |
| 65 | 70 | 75 |
| ttg gac gca gac tcg atc acc tgg ctc cgt gac ttc ctg gcg aag cac | | 288 |
| Leu Asp Ala Asp Ser Ile Thr Trp Leu Arg Asp Phe Leu Ala Lys His | | |
| 85 | 90 | 95 |
| gaa ggt gga ctg atc atg att tcg cac gac gtc gaa ctg ctt ggc gcc | | 336 |
| Glu Gly Leu Ile Met Ile Ser His Asp Val Glu Leu Leu Gly Ala | | |
| 100 | 105 | 110 |
| gta tgt aac aag att tgg tac ctc gac gca gta cgc agc gaa gcc gat | | 384 |
| Val Cys Asn Lys Ile Trp Tyr Leu Asp Ala Val Arg Ser Glu Ala Asp | | |
| 115 | 120 | 125 |
| gtc tac aac atg ggc ttt agc aaa tac gtc gat gca cgt gca ctc gat | | 432 |
| Val Tyr Asn Met Gly Phe Ser Lys Tyr Val Asp Ala Arg Ala Leu Asp | | |
| 130 | 135 | 140 |
| gaa gca cgc cga cgc cgt gag cgc gca aac gcc gaa aag aag gcc gga | | 480 |
| Glu Ala Arg Arg Arg Glu Arg Ala Asn Ala Glu Lys Lys Ala Gly | | |
| 145 | 150 | 155 |
| gcc ctc aag gac cag gct gca cgc ctc ggc gcg aaa gca acc aag gct | | 528 |
| Ala Leu Lys Asp Gln Ala Ala Arg Leu Gly Ala Lys Ala Thr Lys Ala | | |
| 165 | 170 | 175 |
| gcc gca gct aag cag atg atc gcc cgt gcg gaa cga atg atc gac aac | | 576 |
| Ala Ala Ala Lys Gln Met Ile Ala Arg Ala Glu Arg Met Ile Asp Asn | | |
| 180 | 185 | 190 |
| ctc gac gaa atc cgc gta gct gac cgc gcc aac atc gtt ttc cca | | 624 |
| Leu Asp Glu Ile Arg Val Ala Asp Arg Ala Ala Asn Ile Val Phe Pro | | |
| 195 | 200 | 205 |
| gaa cca gca ccc tgt gga aaa acc cca ctc aac gcc aag ggc ctg acc | | 672 |
| Glu Pro Ala Pro Cys Gly Lys Thr Pro Leu Asn Ala Lys Gly Leu Thr | | |
| 210 | 215 | 220 |
| aag atg tac ggc tcc ctc gaa gtc ttc gcc ggc gtc gac cta gcc atc | | 720 |
| Lys Met Tyr Gly Ser Leu Glu Val Phe Ala Gly Val Asp Leu Ala Ile | | |
| 225 | 230 | 235 |
| gac aaa ggc tcc cgc gta gtc gtc ctc gga ttc aac ggt gca ggt aaa | | 768 |
| Asp Lys Gly Ser Arg Val Val Val Leu Gly Phe Asn Gly Ala Gly Lys | | |
| 245 | 250 | 255 |
| acc acc ctg ctc aaa ctc ctc gcc ggt gtg gaa cgc acc gac ggc gaa | | 816 |
| Thr Thr Leu Leu Lys Leu Leu Ala Gly Val Glu Arg Thr Asp Gly Glu | | |

260

265

270

ggc ggc atc gtc acc gga tac ggc ctc aaa atc ggc tac ttc gcc cag 864
 Gly Gly Ile Val Thr Gly Tyr Gly Leu Lys Ile Gly Tyr Phe Ala Gln
 275 280 285

gaa cac gac acc atc gac ccc gac aaa tcc gtc tgg caa aac acc atc 912
 Glu His Asp Thr Ile Asp Pro Asp Lys Ser Val Trp Gln Asn Thr Ile
 290 295 300

gaa gcc tgc gcc gac gcc gac caa caa agc ctc cgc agc ctc ctc gga 960
 Glu Ala Cys Ala Asp Ala Asp Gln Gln Ser Leu Arg Ser Leu Leu Gly
 305 310 315 320

tcc ttc atg ttc tcc ggc gaa caa ctc gac caa cca gca gga aca ctc
 1008
 Ser Phe Met Phe Ser Gly Glu Gln Leu Asp Gln Pro Ala Gly Thr Leu
 325 330 335

tcc ggc ggt gaa aaa acc cgc ctc gca ctg gcc acc ctc gtg tcc tcc
 1056
 Ser Gly Gly Glu Lys Thr Arg Leu Ala Leu Ala Thr Leu Val Ser Ser
 340 345 350

cgc gca aac gtc ctg ctt ctc gac gag ccc acc aac aac ctt gac ccg
 1104
 Arg Ala Asn Val Leu Leu Asp Glu Pro Thr Asn Asn Leu Asp Pro
 355 360 365

atc tcc cgc gaa cag gtc ctc gac gca ctg cgc acc tac acc ggc gca
 1152
 Ile Ser Arg Glu Gln Val Leu Asp Ala Leu Arg Thr Tyr Thr Gly Ala
 370 375 380

gtc gtc ctg gtt acc cac gac ccg ggt gca gtc aag gcc ctt gag cca
 1200
 Val Val Leu Val Thr His Asp Pro Gly Ala Val Lys Ala Leu Glu Pro
 385 390 395 400

gaa cgc gtc atc gtg ctt cct gat ggc acc gag gat ctt tgg aat gat
 1248
 Glu Arg Val Ile Val Leu Pro Asp Gly Thr Glu Asp Leu Trp Asn Asp
 405 410 415

cag tac atg gaa atc gtg gaa ttg gcg taggttctaa ggctgtttat
 1295
 Gln Tyr Met Glu Ile Val Glu Leu Ala
 420 425

gct
 1298

<210> 1104
 <211> 425
 <212> PRT
 <213> *Corynebacterium glutamicum*

<400> 1104
 Ile Arg Lys Tyr Ser Arg Leu Glu Glu Gln Phe Gln Ser Leu Gly Gly
 1 5 10 15

Tyr Glu Ala Asp Ala Glu Ala Ala Gln Ile Cys Asp Asn Leu Gly Leu
 20 25 30

Glu Ala Arg Ile Leu Asp Gln Gln Leu Lys Thr Leu Ser Gly Gly Gln
 35 40 45

Arg Arg Arg Val Glu Leu Ala Gln Ile Leu Phe Ala Ala Thr Asn Gly
 50 55 60

Ser Gly Lys Ser Lys Thr Thr Leu Leu Leu Asp Glu Pro Thr Asn His
 65 70 75 80

Leu Asp Ala Asp Ser Ile Thr Trp Leu Arg Asp Phe Leu Ala Lys His
 85 90 95

Glu Gly Gly Leu Ile Met Ile Ser His Asp Val Glu Leu Leu Gly Ala
 100 105 110

Val Cys Asn Lys Ile Trp Tyr Leu Asp Ala Val Arg Ser Glu Ala Asp
 115 120 125

Val Tyr Asn Met Gly Phe Ser Lys Tyr Val Asp Ala Arg Ala Leu Asp
 130 135 140

Glu Ala Arg Arg Arg Glu Arg Ala Asn Ala Glu Lys Lys Ala Gly
 145 150 155 160

Ala Leu Lys Asp Gln Ala Ala Arg Leu Gly Ala Lys Ala Thr Lys Ala
 165 170 175

Ala Ala Ala Lys Gln Met Ile Ala Arg Ala Glu Arg Met Ile Asp Asn
 180 185 190

Leu Asp Glu Ile Arg Val Ala Asp Arg Ala Ala Asn Ile Val Phe Pro
 195 200 205

Glu Pro Ala Pro Cys Gly Lys Thr Pro Leu Asn Ala Lys Gly Leu Thr
 210 215 220

Lys Met Tyr Gly Ser Leu Glu Val Phe Ala Gly Val Asp Leu Ala Ile
 225 230 235 240

Asp Lys Gly Ser Arg Val Val Val Leu Gly Phe Asn Gly Ala Gly Lys
 245 250 255

Thr Thr Leu Leu Lys Leu Leu Ala Gly Val Glu Arg Thr Asp Gly Glu
 260 265 270

Gly Gly Ile Val Thr Gly Tyr Gly Leu Lys Ile Gly Tyr Phe Ala Gln
 275 280 285

Glu His Asp Thr Ile Asp Pro Asp Lys Ser Val Trp Gln Asn Thr Ile
 290 295 300

Glu Ala Cys Ala Asp Ala Asp Gln Gln Ser Leu Arg Ser Leu Leu Gly
 305 310 315 320

Ser Phe Met Phe Ser Gly Glu Gln Leu Asp Gln Pro Ala Gly Thr Leu
 325 330 335

Ser Gly Gly Glu Lys Thr Arg Leu Ala Leu Ala Thr Leu Val Ser Ser
 340 345 350

Arg Ala Asn Val Leu Leu Leu Asp Glu Pro Thr Asn Asn Leu Asp Pro
 355 360 365

Ile Ser Arg Glu Gln Val Leu Asp Ala Leu Arg Thr Tyr Thr Gly Ala
 370 375 380

Val Val Leu Val Thr His Asp Pro Gly Ala Val Lys Ala Leu Glu Pro
 385 390 395 400

Glu Arg Val Ile Val Leu Pro Asp Gly Thr Glu Asp Leu Trp Asn Asp
 405 410 415

Gln Tyr Met Glu Ile Val Glu Leu Ala
 420 425

<210> 1105

<211> 613

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(613)

<223> RXN03171

<400> 1105

atactttgtt ggactggaaa agtggccgtt tggttccctc caagcccaaa ttgcgcggcg 60

cggctttctt ctggggcggca atgatttaac atgtgaagct atg gac atc acc atc 115
 Met Asp Ile Thr Ile
 1 5

gtc aac cac cca ctc gtt gct agc cgc cta acc ctg ttg cgc gac gag 163
 Val Asn His Pro Leu Val Ala Ser Arg Leu Thr Leu Leu Arg Asp Glu
 10 15 20

cgc agc gac aac gca gct ttc cgt gca gca gcc aac gac ctc ggc gcc 211
 Arg Ser Asp Asn Ala Ala Phe Arg Ala Ala Asn Asp Leu Gly Ala
 25 30 35

atg ctg atc tac gaa gca tcc cga gat ctg gaa gtc gaa cac ttc gac 259
 Met Leu Ile Tyr Glu Ala Ser Arg Asp Leu Glu Val Glu His Phe Asp
 40 45 50

acc aaa acc ccc gtt gcc atg gct gaa ggt act cgc ctg aag cag cca 307
 Thr Lys Thr Pro Val Ala Met Ala Glu Gly Thr Arg Leu Lys Gln Pro
 55 60 65

ccc atc atc gtt ccc atc atc cgt gca ggt ctc ggc atg atc gac cca 355
 Pro Ile Ile Val Pro Ile Ile Arg Ala Gly Leu Gly Met Ile Asp Pro
 70 75 80 85

gcg ctg tcg atg att ccg gat gca cag gtc ggc ttc att ggc ctt gcc 403
 Ala Leu Ser Met Ile Pro Asp Ala Gln Val Gly Phe Ile Gly Leu Ala
 90 95 100

cgc gat gag gaa acc cat gag cca gtc cca tac ctt gag gcg ctg cca 451

| | | |
|---|-----|-----|
| Arg Asp Glu Glu Thr His Glu Pro Val Pro Tyr Leu Glu Ala Leu Pro | | |
| 105 | 110 | 115 |
| cag gat cta agc aac cag cct gta ttc ctt gtc gat ccc atg ctg gcc | | 499 |
| Gln Asp Leu Ser Asn Gln Pro Val Phe Leu Val Asp Pro Met Leu Ala | | |
| 120 | 125 | 130 |
| acc ggc ggt tcc ctc ctg cac gcg atc cgc ctt ctt gct gat cgt ggc | | 547 |
| Thr Gly Gly Ser Leu Leu His Ala Ile Arg Leu Leu Ala Asp Arg Gly | | |
| 135 | 140 | 145 |
| gcc acc gac atc acc gcc atc tgc atg gtt tct gcg cag cca ggt gtg | | 595 |
| Ala Thr Asp Ile Thr Ala Ile Cys Met Val Ser Ala Gln Pro Gly Val | | |
| 150 | 155 | 160 |
| gac gca ttg gcg gaa tct | | 613 |
| Asp Ala Leu Ala Glu Ser | | |
| 170 | | |

<210> 1106

<211> 171

<212> PRT

<213> Corynebacterium glutamicum

<400> 1106

| | | |
|---|---|----|
| Met Asp Ile Thr Ile Val Asn His Pro Leu Val Ala Ser Arg Leu Thr | | |
| 1 | 5 | 10 |
| 15 | | |

| | | |
|---|----|----|
| Leu Leu Arg Asp Glu Arg Ser Asp Asn Ala Ala Phe Arg Ala Ala Ala | | |
| 20 | 25 | 30 |

| | | |
|---|----|----|
| Asn Asp Leu Gly Ala Met Leu Ile Tyr Glu Ala Ser Arg Asp Leu Glu | | |
| 35 | 40 | 45 |

| | | |
|---|----|----|
| Val Glu His Phe Asp Thr Lys Thr Pro Val Ala Met Ala Glu Gly Thr | | |
| 50 | 55 | 60 |

| | | |
|---|----|----|
| Arg Leu Lys Gln Pro Pro Ile Ile Val Pro Ile Ile Arg Ala Gly Leu | | |
| 65 | 70 | 75 |
| 80 | | |

| | | |
|---|----|----|
| Gly Met Ile Asp Pro Ala Leu Ser Met Ile Pro Asp Ala Gln Val Gly | | |
| 85 | 90 | 95 |

| | | |
|---|-----|-----|
| Phe Ile Gly Leu Ala Arg Asp Glu Glu Thr His Glu Pro Val Pro Tyr | | |
| 100 | 105 | 110 |

| | | |
|---|-----|-----|
| Leu Glu Ala Leu Pro Gln Asp Leu Ser Asn Gln Pro Val Phe Leu Val | | |
| 115 | 120 | 125 |

| | | |
|---|-----|-----|
| Asp Pro Met Leu Ala Thr Gly Gly Ser Leu Leu His Ala Ile Arg Leu | | |
| 130 | 135 | 140 |

| | | |
|---|-----|-----|
| Leu Ala Asp Arg Gly Ala Thr Asp Ile Thr Ala Ile Cys Met Val Ser | | |
| 145 | 150 | 155 |
| 160 | | |

| | | |
|---|-----|--|
| Ala Gln Pro Gly Val Asp Ala Leu Ala Glu Ser | | |
| 165 | 170 | |

<210> 1107

<211> 613
 <212> DNA
 <213> *Corynebacterium glutamicum*

<220>
 <221> CDS
 <222> (101)..(613)
 <223> FRXA02857

<400> 1107
 atactttgtt ggactggaaa agtggccgtt tggttccctc caagcccaaa ttgcggcg 60

| | | | | | | | | | |
|------------|------------|------------|------------|-----|-----|-----|-----|-----|-----|
| cggtcttctt | ctggggcgca | atgatttaac | atgtgaagct | atg | gac | atc | acc | atc | 115 |
| | | | | Met | Asp | Ile | Thr | Ile | |
| | | | | 1 | | | | 5 | |

gtc aac cac cca ctc gtt gct agc cgc cta acc ctg ttg cgc gac gag 163
 Val Asn His Pro Leu Val Ala Ser Arg Leu Thr Leu Leu Arg Asp Glu
 10 15 20

cgc agc gac aac gca gct ttc cgt gca gca gcc aac gac ctc ggc gcc 211
 Arg Ser Asp Asn Ala Ala Phe Arg Ala Ala Asn Asp Leu Gly Ala
 25 30 35

atg ctg atc tac gaa gca tcc cga gat ctg gaa gtc gaa cac ttc gac 259
 Met Leu Ile Tyr Glu Ala Ser Arg Asp Leu Glu Val Glu His Phe Asp
 40 45 50

acc aaa acc ccc gtt gcc atg gct gaa ggt act cgc ctg aag cag cca 307
 Thr Lys Thr Pro Val Ala Met Ala Glu Gly Thr Arg Leu Lys Gln Pro
 55 60 65

ccc atc atc gtt ccc atc atc cgt gca ggt ctc ggc atg atc gac cca 355
 Pro Ile Ile Val Pro Ile Ile Arg Ala Gly Leu Gly Met Ile Asp Pro
 70 75 80 85

gcg ctg tcg atg att ccg gat gca cag gtc ggc ttc att ggc ctt gcc 403
 Ala Leu Ser Met Ile Pro Asp Ala Gln Val Gly Phe Ile Gly Leu Ala
 90 95 100

cgc gat gag gaa acc cat gag cca gtc cca tac ctt gag gcg ctg cca 451
 Arg Asp Glu Glu Thr His Glu Pro Val Pro Tyr Leu Glu Ala Leu Pro
 105 110 115

cag gat cta agc aac cag cct gta ttc ctt gtc gat ccc atg ctg gcc 499
 Gln Asp Leu Ser Asn Gln Pro Val Phe Leu Val Asp Pro Met Leu Ala
 120 125 130

acc ggc ggt tcc ctc ctg cac gcg atc cgc ctt ctt gct gat cgt ggc 547
 Thr Gly Gly Ser Leu Leu His Ala Ile Arg Leu Leu Ala Asp Arg Gly
 135 140 145

gcc acc gac atc acc gcc atc tgc atg gtt tct gcg cag cca ggt gtg 595
 Ala Thr Asp Ile Thr Ala Ile Cys Met Val Ser Ala Gln Pro Gly Val
 150 155 160 165

gac gca ttg gcg gaa tct
 Asp Ala Leu Ala Glu Ser
 170

<210> 1108
 <211> 171
 <212> PRT
 <213> *Corynebacterium glutamicum*

<400> 1108
 Met Asp Ile Thr Ile Val Asn His Pro Leu Val Ala Ser Arg Leu Thr
 1 5 10 15
 Leu Leu Arg Asp Glu Arg Ser Asp Asn Ala Ala Phe Arg Ala Ala Ala
 20 25 30
 Asn Asp Leu Gly Ala Met Leu Ile Tyr Glu Ala Ser Arg Asp Leu Glu
 35 40 45
 Val Glu His Phe Asp Thr Lys Thr Pro Val Ala Met Ala Glu Gly Thr
 50 55 60
 Arg Leu Lys Gln Pro Pro Ile Ile Val Pro Ile Ile Arg Ala Gly Leu
 65 70 75 80
 Gly Met Ile Asp Pro Ala Leu Ser Met Ile Pro Asp Ala Gln Val Gly
 85 90 95
 Phe Ile Gly Leu Ala Arg Asp Glu Glu Thr His Glu Pro Val Pro Tyr
 100 105 110
 Leu Glu Ala Leu Pro Gln Asp Leu Ser Asn Gln Pro Val Phe Leu Val
 115 120 125
 Asp Pro Met Leu Ala Thr Gly Gly Ser Leu Leu His Ala Ile Arg Leu
 130 135 140
 Leu Ala Asp Arg Gly Ala Thr Asp Ile Thr Ala Ile Cys Met Val Ser
 145 150 155 160
 Ala Gln Pro Gly Val Asp Ala Leu Ala Glu Ser
 165 170

<210> 1109
 <211> 424
 <212> DNA
 <213> *Corynebacterium glutamicum*

<220>
 <221> CDS
 <222> (101)..(424)
 <223> RXN00450
 <400> 1109
 tttgcgatga catggatttg gatccttccg aacaattgct gcgcatcgcg gaagaactcg 60
 gtttgataa tgatctggct cgggtggcgt gattcgacta gtg ggc gtt tta cct 115
 Val Gly Val Leu Pro
 1 5
 gtg cag gcg cgc atc aaa gac gat gag cgc cgc atg cgc cat gct ttg 163
 Val Gln Ala Arg Ile Lys Asp Asp Glu Arg Arg Met Arg His Ala Leu
 10 15 20

| | |
|--|-----|
| gat att gct cgc caa acc cct gag ggg gac gtt ccc gtt ggc gcc gtc | 211 |
| Asp Ile Ala Arg Gln Thr Pro Glu Gly Asp Val Pro Val Gly Ala Val | |
| 25 30 35 | |
| att tac gcg ccg acc ggg gag atc ctg gcg acc gca acg aac cgt cga | 259 |
| Ile Tyr Ala Pro Thr Gly Glu Ile Leu Ala Thr Ala Thr Asn Arg Arg | |
| 40 45 50 | |
| gaa gca gac cgc gat ccc acg gcc cac gcc gaa att att gct tta cga | 307 |
| Glu Ala Asp Arg Asp Pro Thr Ala His Ala Glu Ile Ile Ala Leu Arg | |
| 55 60 65 | |
| cga gcc gcc cgc cgt ttt tcc gac ggc tgg cgg ctg agt gac tgc acc. | 355 |
| Arg Ala Ala Arg Arg Phe Ser Asp Gly Trp Arg Leu Ser Asp Cys Thr | |
| 70 75 80 85 | |
| gcg gtg gtc acc ttg gag ccc tgc agt atg tgc gcc ggc gcc ttg gtg | 403 |
| Ala Val Val Thr Leu Glu Pro Cys Ser Met Cys Ala Gly Ala Leu Val | |
| 90 95 100 | |
| ggt gct cga atc gga cgc atc | 424 |
| Gly Ala Arg Ile Gly Arg Ile | |
| 105 | |

<210> 1110

<211> 108

<212> PRT

<213> *Corynebacterium glutamicum*

<400> 1110

| | |
|---|--|
| Val Gly Val Leu Pro Val Gln Ala Arg Ile Lys Asp Asp Glu Arg Arg | |
| 1 5 10 15 | |

| | |
|---|--|
| Met Arg His Ala Leu Asp Ile Ala Arg Gln Thr Pro Glu Gly Asp Val | |
| 20 25 30 | |

| | |
|---|--|
| Pro Val Gly Ala Val Ile Tyr Ala Pro Thr Gly Glu Ile Leu Ala Thr | |
| 35 40 45 | |

| | |
|---|--|
| Ala Thr Asn Arg Arg Glu Ala Asp Arg Asp Pro Thr Ala His Ala Glu | |
| 50 55 60 | |

| | |
|---|--|
| Ile Ile Ala Leu Arg Arg Ala Ala Arg Arg Phe Ser Asp Gly Trp Arg | |
| 65 70 75 80 | |

| | |
|---|--|
| Leu Ser Asp Cys Thr Ala Val Val Thr Leu Glu Pro Cys Ser Met Cys | |
| 85 90 95 | |

| | |
|---|--|
| Ala Gly Ala Leu Val Gly Ala Arg Ile Gly Arg Ile | |
| 100 105 | |

<210> 1111

<211> 418

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (101)..(418)

<223> FRXA00450

<400> 1111
tttgcgatga catggatttg gatccttccg aacaattgct gcgcatcgcg gaagaactcg 60
gtttgataa tgatctggct cgggtggtgg gattcgacta gtg ggc gtt tta cct 115
Val Gly Val Leu Pro
1 5
gtg cag gcg cgc atc aaa gac gat gag cgc cgc atg cgc cat gct ttg 163
Val Gln Ala Arg Ile Lys Asp Asp Glu Arg Arg Met Arg His Ala Leu
10 15 20
gat att gct cgc caa acc cct gag ggg gac gtt ccc gtt ggc gcc gtc 211
Asp Ile Ala Arg Gln Thr Pro Glu Gly Asp Val Pro Val Gly Ala Val
25 30 35
att tac gcg ccg acc ggg gag atc ctg gcg acc gca acg aac cgt cga 259
Ile Tyr Ala Pro Thr Gly Glu Ile Leu Ala Thr Ala Thr Asn Arg Arg
40 45 50
gaa gca gac cgc gat ccc acg gcc cac gcc gaa att att gct tta cga 307
Glu Ala Asp Arg Asp Pro Thr Ala His Ala Glu Ile Ile Ala Leu Arg
55 60 65
cga gcc gcc cgc cgt ttt tcc gac ggc tgg cgg ctg agt gac tgc acc 355
Arg Ala Ala Arg Arg Phe Ser Asp Gly Trp Arg Leu Ser Asp Cys Thr
70 75 80 85
gcg gtg gtc acc ttg gag ccc tgc agt atg tgc gcc ggc gcc ttg gtg 403
Ala Val Val Thr Leu Glu Pro Cys Ser Met Cys Ala Gly Ala Leu Val
90 95 100
ggt gct cga atc gga 418
Gly Ala Arg Ile Gly
105

<210> 1112

<211> 106

<212> PRT

<213> *Corynebacterium glutamicum*

<400> 1112

Val Gly Val Leu Pro Val Gln Ala Arg Ile Lys Asp Asp Glu Arg Arg
1 5 10 15Met Arg His Ala Leu Asp Ile Ala Arg Gln Thr Pro Glu Gly Asp Val
20 25 30Pro Val Gly Ala Val Ile Tyr Ala Pro Thr Gly Glu Ile Leu Ala Thr
35 40 45Ala Thr Asn Arg Arg Glu Ala Asp Arg Asp Pro Thr Ala His Ala Glu
50 55 60Ile Ile Ala Leu Arg Arg Ala Ala Arg Arg Phe Ser Asp Gly Trp Arg
65 70 75 80Leu Ser Asp Cys Thr Ala Val Val Thr Leu Glu Pro Cys Ser Met Cys
85 90 95

Ala Gly Ala Leu Val Gly Ala Arg Ile Gly
100 105

<210> 1113
<211> 615
<212> DNA
<213> Corynebacterium glutamicum

<220>
<221> CDS
<222> (101)..(592)
<223> RXA00465

<400> 1113
tccccaacgc gcaccgaact tagccggatc gcagacttca cctggatgtc caccgcagcc 60

caagcgctac cagcggttgcat gcgaggtttg agcgcctaac atg act gaa gat gac 115
Met Thr Glu Asp Asp
1 5

tta gat ctg ctg cac cgc aca gta gaa cta gcc acc cag gca ctc aag 163
Leu Asp Leu Leu His Arg Thr Val Glu Leu Ala Thr Gln Ala Leu Lys
10 15 20

cag gga aac agt cct tat gga tcc ctg ctg gtt gat ccc ttc ggc gcg 211
Gln Gly Asn Ser Pro Tyr Gly Ser Leu Leu Val Asp Pro Phe Gly Ala
25 30 35

gtc gtt ttt gaa gac cac aac cga gat gcc gat ggg gat ctg acc aag 259
Val Val Phe Glu Asp His Asn Arg Asp Ala Asp Gly Asp Leu Thr Lys
40 45 50

cac ccg gaa ttc gcc atc gcc aaa tat gcg atc gaa aat tac agt gca 307
His Pro Glu Phe Ala Ile Ala Lys Tyr Ala Ile Glu Asn Tyr Ser Ala
55 60 65

tca gaa cgt gct gcg tgc act gtt tat acc tcg acg gaa cat tgc gcg 355
Ser Glu Arg Ala Ala Cys Thr Val Tyr Thr Ser Thr Glu His Cys Ala
70 75 80 85

atg tgc gcc ggt gcc cat gcg tgg gct gga ctg ggc aaa att tac tgc 403
Met Cys Ala Gly Ala His Ala Trp Ala Gly Leu Gly Lys Ile Tyr Cys
90 95 100

gcc acc aca ggt ggg caa aca gcc gct tgg tac gca aag tgg ggt gca 451
Ala Thr Thr Gly Gly Gln Thr Ala Ala Trp Tyr Ala Lys Trp Gly Ala
105 110 115

gaa tct ggg cct ttg aac ccg att tca gcg gac aaa att agc ccg aac 499
Glu Ser Gly Pro Leu Asn Pro Ile Ser Ala Asp Lys Ile Ser Pro Asn
120 125 130

ata tcc atc gaa gga cct gct tcc aga ttt gag gaa gtc ctg tat gaa 547
Ile Ser Ile Glu Gly Pro Ala Ser Arg Phe Glu Glu Val Leu Tyr Glu
135 140 145

ctg cat cga tgg ttt tat tta ggg cag tct ccg aat aag gct ctt 592
Leu His Arg Trp Phe Tyr Leu Gly Gln Ser Pro Asn Lys Ala Leu
150 155 160

tagcgctggg catgtgactt taa

615

<210> 1114

<211> 164

<212> PRT

<213> Corynebacterium glutamicum

<400> 1114

Met Thr Glu Asp Asp Leu Asp Leu Leu His Arg Thr Val Glu Leu Ala
1 5 10 15Thr Gln Ala Leu Lys Gln Gly Asn Ser Pro Tyr Gly Ser Leu Leu Val
20 25 30Asp Pro Phe Gly Ala Val Val Phe Glu Asp His Asn Arg Asp Ala Asp
35 40 45Gly Asp Leu Thr Lys His Pro Glu Phe Ala Ile Ala Lys Tyr Ala Ile
50 55 60Glu Asn Tyr Ser Ala Ser Glu Arg Ala Ala Cys Thr Val Tyr Thr Ser
65 70 75 80Thr Glu His Cys Ala Met Cys Ala Gly Ala His Ala Trp Ala Gly Leu
85 90 95Gly Lys Ile Tyr Cys Ala Thr Thr Gly Gly Gln Thr Ala Ala Trp Tyr
100 105 110Ala Lys Trp Gly Ala Glu Ser Gly Pro Leu Asn Pro Ile Ser Ala Asp
115 120 125Lys Ile Ser Pro Asn Ile Ser Ile Glu Gly Pro Ala Ser Arg Phe Glu
130 135 140Glu Val Leu Tyr Glu Leu His Arg Trp Phe Tyr Leu Gly Gln Ser Pro
145 150 155 160

Asn Lys Ala Leu

<210> 1115

<211> 1083

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(1060)

<223> RXA00717

<400> 1115

aagcatcagt taaagccccg actattaaaa tctcctaaaa taggctagaa ttcacggat 60

tcaatttcat acgtttctc tcaagattaa ggacacttac gtg acc cca ccc gct 115
Val Thr Pro Pro Ala
1 5

| | |
|---|-----|
| cgc cga gat ggc aca ccg gac aag aag cag agc aat cgc tct ggc gga | 163 |
| Arg Arg Asp Gly Thr Pro Asp Lys Lys Gln Ser Asn Arg Ser Gly Gly | |
| 10 15 20 | |
| | |
| tac cgg tct tca gtt cgt ggc tac aag cca gga tca tcc cgc cca aac | 211 |
| Tyr Arg Ser Ser Val Arg Gly Tyr Lys Pro Gly Ser Ser Arg Pro Asn | |
| 25 30 35 | |
| | |
| aca cgc cag cag cct cag aag aag gat gag att ctt ctc tcc aac gct | 259 |
| Thr Arg Gln Gln Pro Gln Lys Lys Asp Glu Ile Leu Leu Ser Asn Ala | |
| 40 45 50 | |
| | |
| aag cct gcc aag aag caa aac gta aaa tcc gac gac gat tgg tcg atg | 307 |
| Lys Pro Ala Lys Lys Gln Asn Val Lys Ser Asp Asp Asp Trp Ser Met | |
| 55 60 65 | |
| | |
| ggt ttc tta aac cgc aat gac tct gac gga gtt cgc ctg cag aag gtg | 355 |
| Gly Phe Leu Asn Arg Asn Asp Ser Asp Gly Val Arg Leu Gln Lys Val | |
| 70 75 80 85 | |
| | |
| ctt gcc caa gca ggt gtg gca tca cgt cga cac gca gaa atc ctg att | 403 |
| Leu Ala Gln Ala Gly Val Ala Ser Arg Arg His Ala Glu Ile Leu Ile | |
| 90 95 100 | |
| | |
| gat cag ggc cgt gtg gag gtc aac gat cgt atc gtg acc acc cag ggc | 451 |
| Asp Gln Gly Arg Val Glu Val Asn Asp Arg Ile Val Thr Thr Gln Gly | |
| 105 110 115 | |
| | |
| gtg cgc gtg gat cca aac aac gat gtc atc cgt gtt gac ggc gtc cgc | 499 |
| Val Arg Val Asp Pro Asn Asn Asp Val Ile Arg Val Asp Gly Val Arg | |
| 120 125 130 | |
| | |
| atc cac atc aac gag gac ctc gag tac ttc gtg ctc aac aag cct cgt | 547 |
| Ile His Ile Asn Glu Asp Leu Glu Tyr Phe Val Leu Asn Lys Pro Arg | |
| 135 140 145 | |
| | |
| ggc atg cac tcc acc atg agc gat gaa ctt ggt cgc cca tgc gtg ggt | 595 |
| Gly Met His Ser Thr Met Ser Asp Glu Leu Gly Arg Pro Cys Val Gly | |
| 150 155 160 165 | |
| | |
| gat ctg gtc agt gag aag act gca tct gga cag cgt ctg ttc cac gtc | 643 |
| Asp Leu Val Ser Glu Lys Thr Ala Ser Gly Gln Arg Leu Phe His Val | |
| 170 175 180 | |
| | |
| ggt cgc ctc gac gcg gac acc gaa ggt ttg ctg ctg ctc acc aac gat | 691 |
| Gly Arg Leu Asp Ala Asp Thr Glu Gly Leu Leu Leu Thr Asn Asp | |
| 185 190 195 | |
| | |
| ggt gag ttg gct aac cgc ctc atg cac cct aag tac gaa gtg tcc aag | 739 |
| Gly Glu Leu Ala Asn Arg Leu Met His Pro Lys Tyr Glu Val Ser Lys | |
| 200 205 210 | |
| | |
| act tac ctt gct acc gtt cgc ggt gaa gca acc aat aag cta gtc agc | 787 |
| Thr Tyr Leu Ala Thr Val Arg Gly Glu Ala Thr Asn Lys Leu Val Ser | |
| 215 220 225 | |
| | |
| gct ctt cgt gat ggc gtg gag ttg gaa gat ggc cct gcc aag gct gac | 835 |
| Ala Leu Arg Asp Gly Val Glu Leu Glu Asp Gly Pro Ala Lys Ala Asp | |
| 230 235 240 245 | |
| | |
| ttt gcg cag att atc gac gta ttc cag ggc aag tcc ttg cgc atc | 883 |

Phe Ala Gln Ile Ile Asp Val Phe Gln Gly Lys Ser Leu Leu Arg Ile
 250 255 260
 gaa atc cac gaa ggc cgc aag cac att gtg cga cgc ctc ttc gat gag 931
 Glu Ile His Glu Gly Arg Lys His Ile Val Arg Arg Leu Phe Asp Glu
 265 270 275
 ctc ggt ttc cca gtc gag cgc ctc gtg cgc acc aag ctg cac acc gtt 979
 Leu Gly Phe Pro Val Glu Arg Leu Val Arg Thr Lys Leu His Thr Val
 280 285 290
 cag ctt ggt gat cag aag cca ggt tcc ctt cgt gca ctg aac tcc tct
 1027
 Gln Leu Gly Asp Gln Lys Pro Gly Ser Leu Arg Ala Leu Asn Ser Ser
 295 300 305
 gag ctg acc agc tta tac aag gtg gtc caa ctg tgacggaaat ttccaacatg
 1080
 Glu Leu Thr Ser Leu Tyr Lys Val Val Gln Leu
 310 315 320
 cct
 1083

<210> 1116
 <211> 320
 <212> PRT
 <213> *Corynebacterium glutamicum*

<400> 1116
 Val Thr Pro Pro Ala Arg Arg Asp Gly Thr Pro Asp Lys Lys Gln Ser
 1 5 10 15
 Asn Arg Ser Gly Gly Tyr Arg Ser Ser Val Arg Gly Tyr Lys Pro Gly
 20 25 30
 Ser Ser Arg Pro Asn Thr Arg Gln Gln Pro Gln Lys Lys Asp Glu Ile
 35 40 45
 Leu Leu Ser Asn Ala Lys Pro Ala Lys Lys Gln Asn Val Lys Ser Asp
 50 55 60
 Asp Asp Trp Ser Met Gly Phe Leu Asn Arg Asn Asp Ser Asp Gly Val
 65 70 75 80
 Arg Leu Gln Lys Val Leu Ala Gln Ala Gly Val Ala Ser Arg Arg His
 85 90 95
 Ala Glu Ile Leu Ile Asp Gln Gly Arg Val Glu Val Asn Asp Arg Ile
 100 105 110
 Val Thr Thr Gln Gly Val Arg Val Asp Pro Asn Asn Asp Val Ile Arg
 115 120 125
 Val Asp Gly Val Arg Ile His Ile Asn Glu Asp Leu Glu Tyr Phe Val
 130 135 140
 Leu Asn Lys Pro Arg Gly Met His Ser Thr Met Ser Asp Glu Leu Gly
 145 150 155 160

Arg Pro Cys Val Gly Asp Leu Val Ser Glu Lys Thr Ala Ser Gly Gln
 165 170 175
 Arg Leu Phe His Val Gly Arg Leu Asp Ala Asp Thr Glu Gly Leu Leu
 180 185 190
 Leu Leu Thr Asn Asp Gly Glu Leu Ala Asn Arg Leu Met His Pro Lys
 195 200 205
 Tyr Glu Val Ser Lys Thr Tyr Leu Ala Thr Val Arg Gly Glu Ala Thr
 210 215 220
 Asn Lys Leu Val Ser Ala Leu Arg Asp Gly Val Glu Leu Glu Asp Gly
 225 230 235 240
 Pro Ala Lys Ala Asp Phe Ala Gln Ile Ile Asp Val Phe Gln Gly Lys
 245 250 255
 Ser Leu Leu Arg Ile Glu Ile His Glu Gly Arg Lys His Ile Val Arg
 260 265 270
 Arg Leu Phe Asp Glu Leu Gly Phe Pro Val Glu Arg Leu Val Arg Thr
 275 280 285
 Lys Leu His Thr Val Gln Leu Gly Asp Gln Lys Pro Gly Ser Leu Arg
 290 295 300
 Ala Leu Asn Ser Ser Glu Leu Thr Ser Leu Tyr Lys Val Val Gln Leu
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 <223> RXA01894
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 acccatgaat gaaccggagc aacatcacccg gtccatgagg atg ccc aaa ccc aaa 115
 Met Pro Lys Pro Lys
 1 5
 aat aat gcg ggt cga gat ctc aaa gct gcc att gct gtg ggg atc gga 163
 Asn Asn Ala Gly Arg Asp Leu Lys Ala Ala Ile Ala Val Gly Ile Gly
 10 15 20
 ctg ggg gtc ctg gtt ttg ggg att gtc cta agc cca tgg ggt tgg 211
 Leu Gly Val Leu Val Leu Gly Ile Val Leu Ser Pro Trp Gly Trp
 25 30 35
 tac atc ctc gtt gca ggt ttt atg gct gca gca aca tgg gaa gtt ggt 259
 Tyr Ile Leu Val Ala Gly Phe Met Ala Ala Thr Trp Glu Val Gly

| 40 | 45 | 50 | |
|--|-----|-----|-----|
| agc aga ctt aaa gaa ggc ggc tat cat ttg cca ctg ccg att atg atc Ser Arg Leu Lys Glu Gly Gly Tyr His Leu Pro Leu Pro Ile Met Ile | 55 | 60 | 307 |
| | | 65 | |
| atc ggc ggt cag gca atc atc tgg ctg tca tgg cca ttt ggc acg atg Ile Gly Gly Gln Ala Ile Ile Trp Leu Ser Trp Pro Phe Gly Thr Met | 70 | 75 | 355 |
| | | 80 | 85 |
| ggc att ttg gcg tct ttt gtg gcc act gtg ttg gtg ctg atg tat ttc Gly Ile Leu Ala Ser Phe Val Ala Thr Val Leu Val Leu Met Tyr Phe | 90 | 95 | 403 |
| | | | 100 |
| cga att ttc tac aat ggc acg gaa aaa gaa gcc cgc aac tat ttg agg Arg Ile Phe Tyr Asn Gly Thr Glu Lys Glu Ala Arg Asn Tyr Leu Arg | 105 | 110 | 451 |
| | | | 115 |
| gac acc tct gtg ggc atc ttc gtg ctc acc tgg att cca ttg ttc gga Asp Thr Ser Val Gly Ile Phe Val Leu Thr Trp Ile Pro Leu Phe Gly | 120 | 125 | 499 |
| | | | 130 |
| agc ttc gct gcg atg ctg tcg ctg atg caa aac aat tcc atc ccg ggt Ser Phe Ala Ala Met Leu Ser Leu Met Gln Asn Asn Ser Ile Pro Gly | 135 | 140 | 547 |
| | | | 145 |
| aca tat ttc att ttg acg ttc atg ctg tgt gtg atc gca tcg gat gtg Thr Tyr Phe Ile Leu Thr Phe Met Leu Cys Val Ile Ala Ser Asp Val | 150 | 155 | 595 |
| | | 160 | 165 |
| ggc ggg tat atc gcg ggt gtg ttc ttt gga tcg cac cca atg gcg ccg Gly Gly Tyr Ile Ala Gly Val Phe Phe Gly Ser His Pro Met Ala Pro | 170 | 175 | 643 |
| | | | 180 |
| ttg gtg agt ccg aag aag tct tgg gaa ggc ttt gcc ggc tcc att gtc Leu Val Ser Pro Lys Lys Ser Trp Glu Gly Phe Ala Gly Ser Ile Val | 185 | 190 | 691 |
| | | | 195 |
| tta gga tcg gtc act ggt gca ctc agt gtt cac ttc ctg ctc gat cac Leu Gly Ser Val Thr Gly Ala Leu Ser Val His Phe Leu Leu Asp His | 200 | 205 | 739 |
| | | | 210 |
| cac tgg tgg atg ggt gtg atc ttg ggt tgt gcc cta gtt gtg tgc gcc His Trp Trp Met Gly Val Ile Leu Gly Cys Ala Leu Val Val Cys Ala | 215 | 220 | 787 |
| | | | 225 |
| acg ttg ggt gac ttg gtt gag tcg cag ttc aaa cgc gat ttg ggc atc Thr Leu Gly Asp Leu Val Glu Ser Gln Phe Lys Arg Asp Leu Gly Ile | 230 | 235 | 835 |
| | | 240 | 245 |
| aag gat atg tcg aac ctt ctt cca ggc cac ggc gga ttg atg gac cgt Lys Asp Met Ser Asn Leu Leu Pro Gly His Gly Gly Leu Met Asp Arg | 250 | 255 | 883 |
| | | | 260 |
| ttg gat ggc atg ctc ccg gcc gcg atg gtg acg tgg ttg atc ctg agt Leu Asp Gly Met Leu Pro Ala Ala Met Val Thr Trp Leu Ile Leu Ser | 265 | 270 | 931 |
| | | | 275 |
| gtg atc agc agc tcg tat ccg tcg taaaagcttgg gccagcttta agt Val Ile Ser Ser Ser Tyr Pro Ser | 280 | 285 | 978 |

<210> 1118

<211> 285

<212> PRT

<213> *Corynebacterium glutamicum*

<400> 1118

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Pro | Lys | Pro | Lys | Asn | Asn | Ala | Gly | Arg | Asp | Leu | Lys | Ala | Ala | Ile |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Ala | Val | Gly | Ile | Gly | Leu | Gly | Val | Leu | Leu | Leu | Gly | Ile | Val | Leu | |
| | | | | | 20 | | | 25 | | | | 30 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Pro | Trp | Gly | Trp | Tyr | Ile | Leu | Val | Ala | Gly | Phe | Met | Ala | Ala | Ala |
| | | | | | 35 | | | 40 | | | | 45 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Thr | Trp | Glu | Val | Gly | Ser | Arg | Leu | Lys | Glu | Gly | Tyr | His | Leu | Pro | |
| | | | | | 50 | | | 55 | | | 60 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Pro | Ile | Met | Ile | Ile | Gly | Gly | Gln | Ala | Ile | Ile | Trp | Leu | Ser | Trp |
| | | | | | 65 | | | 70 | | | 75 | | | 80 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Phe | Gly | Thr | Met | Gly | Ile | Leu | Ala | Ser | Phe | Val | Ala | Thr | Val | Leu |
| | | | | | 85 | | | | 90 | | | 95 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Leu | Met | Tyr | Phe | Arg | Ile | Phe | Tyr | Asn | Gly | Thr | Glu | Lys | Glu | Ala |
| | | | | | 100 | | | 105 | | | | 110 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Asn | Tyr | Leu | Arg | Asp | Thr | Ser | Val | Gly | Ile | Phe | Val | Leu | Thr | Trp |
| | | | | | 115 | | | 120 | | | 125 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Pro | Leu | Phe | Gly | Ser | Phe | Ala | Ala | Met | Leu | Ser | Leu | Met | Gln | Asn |
| | | | | | 130 | | | 135 | | | 140 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Ser | Ile | Pro | Gly | Thr | Tyr | Phe | Ile | Leu | Thr | Phe | Met | Leu | Cys | Val |
| | | | | | 145 | | | 150 | | | 155 | | | 160 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Ala | Ser | Asp | Val | Gly | Gly | Tyr | Ile | Ala | Gly | Val | Phe | Phe | Gly | Ser |
| | | | | | 165 | | | | 170 | | | 175 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| His | Pro | Met | Ala | Pro | Leu | Val | Ser | Pro | Lys | Lys | Ser | Trp | Glu | Gly | Phe |
| | | | | | 180 | | | 185 | | | 190 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Gly | Ser | Ile | Val | Leu | Gly | Ser | Val | Thr | Gly | Ala | Leu | Ser | Val | His |
| | | | | | 195 | | | 200 | | | 205 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Phe | Leu | Leu | Asp | His | His | Trp | Trp | Met | Gly | Val | Ile | Leu | Gly | Cys | Ala |
| | | | | | 210 | | | 215 | | | 220 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Val | Val | Cys | Ala | Thr | Leu | Gly | Asp | Leu | Val | Glu | Ser | Gln | Phe | Lys |
| | | | | | 225 | | | 230 | | | 235 | | | 240 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Asp | Leu | Gly | Ile | Lys | Asp | Met | Ser | Asn | Leu | Leu | Pro | Gly | His | Gly |
| | | | | | 245 | | | 250 | | | 255 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Leu | Met | Asp | Arg | Leu | Asp | Gly | Met | Leu | Pro | Ala | Ala | Met | Val | Thr |
| | | | | | 260 | | | 265 | | | | | 270 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|
| Trp | Leu | Ile | Leu | Ser | Val | Ile | Ser | Ser | Ser | Tyr | Pro | Ser | | | |
| | | | | | 275 | | | 280 | | | 285 | | | | |

<210> 1119
 <211> 879
 <212> DNA
 <213> *Corynebacterium glutamicum*

<220>
 <221> CDS
 <222> (101)..(856)
 <223> RXA02536

<400> 1119
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 gcgtattgcc ttgcttcaga tctcgacgaa ttccgataag atg gac aac ttc gcc 115
 Met Asp Asn Phe Ala
 1 5

ctg ctg cgt gat gct gaa aaa gct gcg gaa cag ggg gct cgg gtg 163
 Leu Leu Arg Asp Ala Ala Glu Lys Ala Ala Glu Gln Gly Ala Arg Val
 10 15 20

ttg gtg ttt ccg gag gcg act tcg caa agc ttt ggt acg gga agg ctt 211
 Leu Val Phe Pro Glu Ala Thr Ser Gln Ser Phe Gly Thr Gly Arg Leu
 25 30 35

gat act cag gcg gag gac ctc gat ggc gaa ttc tcc acc gcg gta cga 259
 Asp Thr Gln Ala Glu Glu Leu Asp Gly Glu Phe Ser Thr Ala Val Arg
 40 45 50

aaa tta gcc gat gag ctg gac gtt gtc atc gtt gcg ggc atg ttc acc 307
 Lys Leu Ala Asp Glu Leu Asp Val Val Ile Val Ala Gly Met Phe Thr
 55 60 65

cct gct gac acc gtg cag cgc ggt gaa aaa acg atc tcg cgc gtc aac 355
 Pro Ala Asp Thr Val Gln Arg Gly Glu Lys Thr Ile Ser Arg Val Asn
 70 75 80 85

aac acc gtg ctg att agt ggc gct gga ttg cat cag gga tac aac aaa 403
 Asn Thr Val Leu Ile Ser Gly Ala Gly Leu His Gln Gly Tyr Asn Lys
 90 95 100

att cac aca tat gac gcg ttc ggt tat agg gaa tcc gac act gtg aaa 451
 Ile His Thr Tyr Asp Ala Phe Gly Tyr Arg Glu Ser Asp Thr Val Lys
 105 110 115

ccg ggc gat gag ctg gtt gta ttc gag gtc gac gat att aaa ttt ggt 499
 Pro Gly Asp Glu Leu Val Val Phe Glu Val Asp Asp Ile Lys Phe Gly
 120 125 130

gtg gcg aca tgc tac gat att cga ttc cca gaa cag ttc aaa gac ctc 547
 Val Ala Thr Cys Tyr Asp Ile Arg Phe Pro Glu Gln Phe Lys Asp Leu
 135 140 145

gcc cgc aac ggt gca cag ata att gtg gtt ccc acg tcg tgg caa gac 595
 Ala Arg Asn Gly Ala Gln Ile Ile Val Val Pro Thr Ser Trp Gln Asp
 150 155 160 165

ggt cct gga aaa tta gaa caa tgg gaa gtc ctc cct cgc gcg cgt gca 643
 Gly Pro Gly Lys Leu Glu Gln Trp Glu Val Leu Pro Arg Ala Arg Ala

| 170 | 175 | 180 | |
|---|-----|-----|-----|
| ctg gat tcc acc tgc tgg atc gta gcg tgt ggg caa gcg cga ctt cca Leu Asp Ser Thr Cys Trp Ile Val Ala Cys Gly Gln Ala Arg Leu Pro 185 | 190 | 195 | 691 |
| gaa gaa tta cgc gat gaa cga aaa ggc cct acg ggg att ggt cat tcc Glu Glu Leu Arg Asp Glu Arg Lys Gly Pro Thr Gly Ile Gly His Ser 200 | 205 | 210 | 739 |
| atg gtg aca aac cca cac ggt gaa gta att gct agc gcg ggt tat gag Met Val Thr Asn Pro His Gly Glu Val Ile Ala Ser Ala Gly Tyr Glu 215 | 220 | 225 | 787 |
| cca gaa atg ttg atc gcg gat att gat gtc agc ggt ttg gcc aaa att Pro Glu Met Leu Ile Ala Asp Ile Asp Val Ser Gly Leu Ala Lys Ile 230 | 235 | 240 | 835 |
| cgg gag gca ttg cct gtt ctt taaccactgt ctaaggaatc act Arg Glu Ala Leu Pro Val Leu 250 | | | 879 |
| <210> 1120 | | | |
| <211> 252 | | | |
| <212> PRT | | | |
| <213> <i>Corynebacterium glutamicum</i> | | | |
| <400> 1120 | | | |
| Met Asp Asn Phe Ala Leu Leu Arg Asp Ala Ala Glu Lys Ala Ala Glu 1 | 5 | 10 | 15 |
| Gln Gly Ala Arg Val Leu Val Phe Pro Glu Ala Thr Ser Gln Ser Phe 20 | 25 | 30 | |
| Gly Thr Gly Arg Leu Asp Thr Gln Ala Glu Glu Leu Asp Gly Glu Phe 35 | 40 | 45 | |
| Ser Thr Ala Val Arg Lys Leu Ala Asp Glu Leu Asp Val Val Ile Val 50 | 55 | 60 | |
| Ala Gly Met Phe Thr Pro Ala Asp Thr Val Gln Arg Gly Glu Lys Thr 65 | 70 | 75 | 80 |
| Ile Ser Arg Val Asn Asn Thr Val Leu Ile Ser Gly Ala Gly Leu His 85 | 90 | 95 | |
| Gln Gly Tyr Asn Lys Ile His Thr Tyr Asp Ala Phe Gly Tyr Arg Glu 100 | 105 | 110 | |
| Ser Asp Thr Val Lys Pro Gly Asp Glu Leu Val Val Phe Glu Val Asp 115 | 120 | 125 | |
| Asp Ile Lys Phe Gly Val Ala Thr Cys Tyr Asp Ile Arg Phe Pro Glu 130 | 135 | 140 | |
| Gln Phe Lys Asp Leu Ala Arg Asn Gly Ala Gln Ile Ile Val Val Pro 145 | 150 | 155 | 160 |
| Thr Ser Trp Gln Asp Gly Pro Gly Lys Leu Glu Gln Trp Glu Val Leu 165 | 170 | 175 | |

Pro Arg Ala Arg Ala Leu Asp Ser Thr Cys Trp Ile Val Ala Cys Gly
180 185 190

Gln Ala Arg Leu Pro Glu Glu Leu Arg Asp Glu Arg Lys Gly Pro Thr
195 200 205

Gly Ile Gly His Ser Met Val Thr Asn Pro His Gly Glu Val Ile Ala
210 215 220

Ser Ala Gly Tyr Glu Pro Glu Met Leu Ile Ala Asp Ile Asp Val Ser
225 230 235 240

Gly Leu Ala Lys Ile Arg Glu Ala Leu Pro Val Leu
245 250

<210> 1121

<211> 1528

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(1528)

<223> RXN01209

<400> 1121

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ctttatgacg tggatgcccga ggctgtggcc tcgttggttg atg tgc gag agg cct 115
Met Cys Glu Arg Pro
1 5

gaa aag tac gtg act gat ttt tct ttg tat ctg gtc acc gat ccc gtt 163
Glu Lys Tyr Val Thr Asp Phe Ser Leu Tyr Leu Val Thr Asp Pro Val
10 15 20

ttg ggt ggc ggg cca aaa aaa gta gct gga att gtt gac agc gca att 211
Leu Gly Gly Pro Lys Lys Val Ala Gly Ile Val Asp Ser Ala Ile
25 30 35

tcc ggc gga gtt tct gtg ctg cag ctg cgc gat aag aac tca ggc gtg 259
Ser Gly Gly Val Ser Val Val Gln Leu Arg Asp Lys Asn Ser Gly Val
40 45 50

gaa gat gtt cgt gcg gca gca aag gag ctg aaa gaa ctc tgc gat gct 307
Glu Asp Val Arg Ala Ala Lys Glu Leu Lys Glu Leu Cys Asp Ala
55 60 65

cgc ggg gtg gcg ctt gtt gtc aac gat tac tta gat atc gcc gtt gag 355
Arg Gly Val Ala Leu Val Val Asn Asp Tyr Leu Asp Ile Ala Val Glu
70 75 80 85

ctg ggt ctt cac ctg cac att ggt caa ggc gat aca cct tat acg caa 403
Leu Gly Leu His Leu His Ile Gly Gln Gly Asp Thr Pro Tyr Thr Gln
90 95 100

gca cgg gag ctg ctt cca gct cat ctt gaa ttg ggt ttg agc att gaa 451
Ala Arg Glu Leu Leu Pro Ala His Leu Glu Leu Gly Leu Ser Ile Glu
105 110 115

| | |
|---|-----|
| aac ctg gat caa ttg cat gct gtg atc gcg cag tgc gcc gag act ggt | 499 |
| Asn Leu Asp Gln Leu His Ala Val Ile Ala Gln Cys Ala Glu Thr Gly | |
| 120 125 130 | |
| gtg gca ttg ccc gat gtg att ggc att ggt ccg gtg gcc tct act gcg | 547 |
| Val Ala Leu Pro Asp Val Ile Gly Ile Gly Pro Val Ala Ser Thr Ala | |
| 135 140 145 | |
| acc aaa cca gat gcg gca ccc gca ttg ggt gtg gag ggc atc gct gag | 595 |
| Thr Lys Pro Asp Ala Ala Pro Ala Leu Gly Val Glu Gly Ile Ala Glu | |
| 150 155 160 165 | |
| atc gcc gct gta gct caa gac cac ggc atc gca tca gta gct att gga | 643 |
| Ile Ala Ala Val Ala Gln Asp His Gly Ile Ala Ser Val Ala Ile Gly | |
| 170 175 180 | |
| ggc gtt ggt cta cgc aac gcg gcc gaa ctc gct gct acg ccc atc gac | 691 |
| Gly Val Gly Leu Arg Asn Ala Ala Glu Leu Ala Ala Thr Pro Ile Asp | |
| 185 190 195 | |
| ggt ctg tgc gtg gtc tct gaa atc atg acc gcc gcc aat cca gca gct | 739 |
| Gly Leu Cys Val Val Ser Glu Ile Met Thr Ala Ala Asn Pro Ala Ala | |
| 200 205 210 | |
| gcg gca act cgc ctg cgg act gct ttt caa cct act ttc tcg cct gaa | 787 |
| Ala Ala Thr Arg Leu Arg Thr Ala Phe Gln Pro Thr Phe Ser Pro Glu | |
| 215 220 225 | |
| act caa act gaa ctc tct caa aca gaa ctc caa gga gcc ttc gtg aat | 835 |
| Thr Gln Thr Glu Leu Ser Gln Thr Glu Leu Gln Gly Ala Phe Val Asn | |
| 230 235 240 245 | |
| tcg cct tct gcc cca cgt gtg ttg tct att gca ggc act gat ccc aca | 883 |
| Ser Pro Ser Ala Pro Arg Val Leu Ser Ile Ala Gly Thr Asp Pro Thr | |
| 250 255 260 | |
| ggt ggt gca ggt att cag gct gat ctg aag tcc att gca gca ggt ggc | 931 |
| Gly Gly Ala Gly Ile Gln Ala Asp Leu Lys Ser Ile Ala Ala Gly Gly | |
| 265 270 275 | |
| ggc tac ggc atg tgc gtt gtg acc tcg ctg gtc gcg caa aac acc cac | 979 |
| Gly Tyr Gly Met Cys Val Val Thr Ser Leu Val Ala Gln Asn Thr His | |
| 280 285 290 | |
| ggc gtc aac acg atc cac acc cca ccc ttg acc ttt ttg gaa gaa cag | |
| 1027 | |
| Gly Val Asn Thr Ile His Thr Pro Pro Leu Thr Phe Leu Glu Glu Gln | |
| 295 300 305 | |
| ctg gaa gcg gtc ttt tcc gat gtc acc gtc gat gcc atc aag ctc ggc | |
| 1075 | |
| Leu Glu Ala Val Phe Ser Asp Val Thr Val Asp Ala Ile Lys Leu Gly | |
| 310 315 320 325 | |
| atg ttg ggc tct gcc gac acc gtc gat ctg gtg gct tca tgg ctt ggt | |
| 1123 | |
| Met Leu Gly Ser Ala Asp Thr Val Asp Leu Val Ala Ser Trp Leu Gly | |
| 330 335 340 | |

tcc cac gag cac ggt ccc gtg gtg ctt gat ccc gtc atg atc gcc acc
1171

Ser His Glu His Gly Pro Val Val Leu Asp Pro Val Met Ile Ala Thr
345 350 355

agc ggt gat cgc cta ctg gat gcg agc gct gaa gaa tcg ctg cgc cgc
1219

Ser Gly Asp Arg Leu Leu Asp Ala Ser Ala Glu Glu Ser Leu Arg Arg
360 365 370

ctg gcc gtg cac gtc gat gtg gtc acc ccg aat atc ccc gaa ctt gcc
1267

Leu Ala Val His Val Asp Val Val Thr Pro Asn Ile Pro Glu Leu Ala
375 380 385

gtg ttg tgc gac agt gct cct gcc atc acc atg gat gag gcc att gct
1315

Val Leu Cys Asp Ser Ala Pro Ala Ile Thr Met Asp Glu Ala Ile Ala
390 395 400 405

cag gct cag gga ttt gcg cgg act cat gac acc atc gtc att gtc aag
1363

Gln Ala Gln Gly Phe Ala Arg Thr His Asp Thr Ile Val Ile Val Lys
410 415 420

ggg gga cat ctg act ggc gcg ctt gct gat aac gct gtc gtg cgc ccc
1411

Gly Gly His Leu Thr Gly Ala Leu Ala Asp Asn Ala Val Val Arg Pro
425 430 435

gac ggc tcg gtg ttc cag gtg gaa aac ctg cgt gtc aac acc acc aac
1459

Asp Gly Ser Val Phe Gln Val Glu Asn Leu Arg Val Asn Thr Thr Asn
440 445 450

tcc cat ggc aca ggc tgt tcg ctc tct gcg tca ctt gcc acc aag atc
1507

Ser His Gly Thr Gly Cys Ser Leu Ser Ala Ser Leu Ala Thr Lys Ile
455 460 465

gcc ggc gaa agc gtg gaa
1528

Ala Ala Gly Glu Ser Val Glu
470 475

<210> 1122

<211> 476

<212> PRT

<213> *Corynebacterium glutamicum*

<400> 1122

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Val Thr Asp Pro Val Leu Gly Gly Pro Lys Lys Val Ala Gly Ile
20 25 30

Val Asp Ser Ala Ile Ser Gly Gly Val Ser Val Val Gln Leu Arg Asp
35 40 45

Lys Asn Ser Gly Val Glu Asp Val Arg Ala Ala Ala Lys Glu Leu Lys
 50 55 60

Glu Leu Cys Asp Ala Arg Gly Val Ala Leu Val Val Asn Asp Tyr Leu
 65 70 75 80

Asp Ile Ala Val Glu Leu Gly Leu His Leu His Ile Gly Gln Gly Asp
 85 90 95

Thr Pro Tyr Thr Gln Ala Arg Glu Leu Leu Pro Ala His Leu Glu Leu
 100 105 110

Gly Leu Ser Ile Glu Asn Leu Asp Gln Leu His Ala Val Ile Ala Gln
 115 120 125

Cys Ala Glu Thr Gly Val Ala Leu Pro Asp Val Ile Gly Ile Gly Pro
 130 135 140

Val Ala Ser Thr Ala Thr Lys Pro Asp Ala Ala Pro Ala Leu Gly Val
 145 150 155 160

Glu Gly Ile Ala Glu Ile Ala Ala Val Ala Gln Asp His Gly Ile Ala
 165 170 175

Ser Val Ala Ile Gly Gly Val Gly Leu Arg Asn Ala Ala Glu Leu Ala
 180 185 190

Ala Thr Pro Ile Asp Gly Leu Cys Val Val Ser Glu Ile Met Thr Ala
 195 200 205

Ala Asn Pro Ala Ala Ala Ala Thr Arg Leu Arg Thr Ala Phe Gln Pro
 210 215 220

Thr Phe Ser Pro Glu Thr Gln Thr Glu Leu Ser Gln Thr Glu Leu Gln
 225 230 235 240

Gly Ala Phe Val Asn Ser Pro Ser Ala Pro Arg Val Leu Ser Ile Ala
 245 250 255

Gly Thr Asp Pro Thr Gly Gly Ala Gly Ile Gln Ala Asp Leu Lys Ser
 260 265 270

Ile Ala Ala Gly Gly Gly Tyr Gly Met Cys Val Val Thr Ser Leu Val
 275 280 285

Ala Gln Asn Thr His Gly Val Asn Thr Ile His Thr Pro Pro Leu Thr
 290 295 300

Phe Leu Glu Glu Gln Leu Glu Ala Val Phe Ser Asp Val Thr Val Asp
 305 310 315 320

Ala Ile Lys Leu Gly Met Leu Gly Ser Ala Asp Thr Val Asp Leu Val
 325 330 335

Ala Ser Trp Leu Gly Ser His Glu His Gly Pro Val Val Leu Asp Pro
 340 345 350

Val Met Ile Ala Thr Ser Gly Asp Arg Leu Leu Asp Ala Ser Ala Glu
 355 360 365

Glu Ser Leu Arg Arg Leu Ala Val His Val Asp Val Val Thr Pro Asn

| | | |
|---|-----|-----|
| 370 | 375 | 380 |
| Ile Pro Glu Leu Ala Val Leu Cys Asp Ser Ala Pro Ala Ile Thr Met | | |
| 385 | 390 | 395 |
| Asp Glu Ala Ile Ala Gln Ala Gln Gly Phe Ala Arg Thr His Asp Thr | | |
| 405 | 410 | 415 |
| Ile Val Ile Val Lys Gly Gly His Leu Thr Gly Ala Leu Ala Asp Asn | | |
| 420 | 425 | 430 |
| Ala Val Val Arg Pro Asp Gly Ser Val Phe Gln Val Glu Asn Leu Arg | | |
| 435 | 440 | 445 |
| Val Asn Thr Thr Asn Ser His Gly Thr Gly Cys Ser Leu Ser Ala Ser | | |
| 450 | 455 | 460 |
| Leu Ala Thr Lys Ile Ala Ala Gly Glu Ser Val Glu | | |
| 465 | 470 | 475 |

<210> 1123

<211> 1528

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (101)..(1528)

<223> FRXA01209

<400> 1123

cagattgcag cacagaaggc atcggcgcca ggcagctttg cgggtggcggtt tattgatgcg 60

| | | | | | |
|-----------------------|------------|------------|-------------|---------|-----|
| ctttatgacg tggatgcccc | ggctgtggcc | tcgttggttt | atg tgc gag | agg cct | 115 |
| | | | Met Cys | Glu Arg | Pro |
| | | | 1 | | 5 |

| | | | | | |
|---|----|----|--|--|-----|
| gaa aag tac gtg act gat ttt tct ttg tat ctg gtc acc gat ccc gtt | | | | | 163 |
| Glu Lys Tyr Val Thr Asp Phe Ser Leu Tyr Leu Val Thr Asp Pro Val | | | | | |
| 10 | 15 | 20 | | | |

| | | | | | |
|---|----|----|--|--|-----|
| ttg ggt ggc ggg cca aaa aaa gta gct gga att gtt gac agc gca att | | | | | 211 |
| Leu Gly Gly Pro Lys Lys Val Ala Gly Ile Val Asp Ser Ala Ile | | | | | |
| 25 | 30 | 35 | | | |

| | | | | | |
|---|----|----|--|--|-----|
| tcc ggc gga gtt tct gtg cag ctg cgc gat aag aac tca ggc gtg | | | | | 259 |
| Ser Gly Gly Val Ser Val Val Gln Leu Arg Asp Lys Asn Ser Gly Val | | | | | |
| 40 | 45 | 50 | | | |

| | | | | | |
|---|----|----|--|--|-----|
| gaa gat gtt cgt gcg gca gca aag gag ctg aaa gaa ctc tgc gat gct | | | | | 307 |
| Glu Asp Val Arg Ala Ala Lys Glu Leu Lys Glu Leu Cys Asp Ala | | | | | |
| 55 | 60 | 65 | | | |

| | | | | | |
|---|----|----|----|--|-----|
| cgc ggg gtg gcg ctt gtt gtc aac gat tac tta gat atc gcc gtt gag | | | | | 355 |
| Arg Gly Val Ala Leu Val Val Asn Asp Tyr Leu Asp Ile Ala Val Glu | | | | | |
| 70 | 75 | 80 | 85 | | |

| | | | | | |
|---|----|-----|--|--|-----|
| ctg ggt ctt cac ctg cac att ggt caa ggc gat aca cct tat acg caa | | | | | 403 |
| Leu Gly Leu His Leu His Ile Gly Gln Gly Asp Thr Pro Tyr Thr Gln | | | | | |
| 90 | 95 | 100 | | | |

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| gca | cg | gag | ctg | ctt | cca | gct | cat | ctt | gaa | ttg | ggt | ttg | agc | att | gaa | 451 | |
| Ala | Arg | Glu | Leu | Leu | Pro | Ala | His | Leu | Glu | Leu | Gly | Leu | Ser | Ile | Glu | | |
| 105 | | | | | | | | 110 | | | | | 115 | | | | |
| aac | ctg | gat | caa | ttg | cat | gct | gtg | atc | g | c | a | g | act | ggt | 499 | | |
| Asn | Leu | Asp | Gln | Leu | His | Ala | Val | Ile | Ala | Gln | Cys | Ala | Glu | Thr | Gly | | |
| 120 | | | | | | | 125 | | | | 130 | | | | | | |
| gtg | gca | ttg | ccc | gat | gtg | att | ggc | att | ggt | ccg | gtg | gcc | tct | act | g | 547 | |
| Val | Ala | Leu | Pro | Asp | Val | Ile | Gly | Ile | Gly | Pro | Val | Ala | Ser | Thr | Ala | | |
| 135 | | | | | | | 140 | | | | 145 | | | | | | |
| acc | aaa | cca | gat | g | c | g | cc | g | c | ttg | g | gt | g | gc | atc | g | 595 |
| Thr | Lys | Pro | Asp | Ala | Ala | Pro | Ala | Leu | Gly | Val | Glu | Gly | Ile | Ala | Glu | | |
| 150 | | | | | | | 155 | | | 160 | | | 165 | | | | |
| atc | gcc | gct | gta | g | c | a | g | c | a | tc | g | ta | g | c | att | g | 643 |
| Ile | Ala | Ala | Val | Ala | Gln | Asp | His | Gly | Ile | Ala | Ser | Val | Ala | Ile | Gly | | |
| 170 | | | | | | | 175 | | | 180 | | | | | | | |
| ggc | gtt | g | gt | c | ta | c | gc | a | ac | g | cc | g | c | cc | atc | g | 691 |
| Gly | Val | Gly | Leu | Arg | Asn | Ala | Ala | Glu | Leu | Ala | Ala | Thr | Pro | Ile | Asp | | |
| 185 | | | | | | | 190 | | | 195 | | | | | | | |
| ggt | ctg | tgc | gtg | gtc | tct | gaa | atc | atg | acc | g | cc | g | cc | aat | cc | g | 739 |
| Gly | Leu | Cys | Val | Val | Ser | Glu | Ile | Met | Thr | Ala | Ala | Asn | Pro | Ala | Ala | | |
| 200 | | | | | | | 205 | | | 210 | | | | | | | |
| g | cg | g | ca | act | cgc | ctg | cg | act | g | c | t | tt | tc | c | t | gaa | 787 |
| Ala | Ala | Thr | Arg | Leu | Arg | Thr | Ala | Phe | Gln | Pro | Thr | Phe | Ser | Pro | Glu | | |
| 215 | | | | | | | 220 | | | 225 | | | | | | | |
| act | caa | act | gaa | ctc | tct | caa | aca | gaa | ctc | caa | gga | g | cc | t | tc | g | 835 |
| Thr | Gln | Thr | Glu | Leu | Ser | Gln | Thr | Glu | Leu | Gln | Gly | Ala | Phe | Val | Asn | | |
| 230 | | | | | | | 235 | | | 240 | | | 245 | | | | |
| tcg | cct | tct | g | cc | cc | cgt | gt | tt | tct | att | g | ca | g | cc | ac | 883 | |
| Ser | Pro | Ser | Ala | Pro | Arg | Val | Leu | Ser | Ile | Ala | Gly | Thr | Asp | Pro | Thr | | |
| 250 | | | | | | | 255 | | | 260 | | | | | | | |
| g | gt | g | gt | att | cag | g | c | ttt | g | at | g | ca | g | gt | gg | 931 | |
| Gly | Gly | Ala | Gly | Ile | Gln | Ala | Asp | Leu | Lys | Ser | Ile | Ala | Ala | Gly | Gly | | |
| 265 | | | | | | | 270 | | | 275 | | | | | | | |
| ggc | tac | ggc | atg | tgc | gtt | gt | acc | tc | gt | gt | cc | g | ca | aa | cc | cac | 979 |
| Gly | Tyr | Gly | Met | Cys | Val | Val | Thr | Ser | Leu | Val | Ala | Gln | Asn | Thr | His | | |
| 280 | | | | | | | 285 | | | 290 | | | | | | | |
| ggc | gtc | aa | ac | ac | atc | ca | cc | cc | tt | g | cc | ttt | tt | g | aa | cag | 1027 |
| Gly | Val | Asn | Thr | Ile | His | Thr | Pro | Pro | Leu | Thr | Phe | Leu | Glu | Gln | | | |
| 295 | | | | | | | 300 | | | 305 | | | | | | | |
| ctg | gaa | g | cg | gt | tt | tcc | g | atc | g | tc | g | cc | atc | a | g | cc | 1075 |
| Leu | Glu | Ala | Val | Phe | Ser | Asp | Val | Thr | Val | Asp | Ala | Ile | Lys | Leu | Gly | | |
| 310 | | | | | | | 315 | | | 320 | | | 325 | | | | |
| atg | ttg | ggc | tct | g | cc | g | a | cc | gt | gt | g | c | tca | tgg | ctt | ggt | 1123 |

Met Leu Gly Ser Ala Asp Thr Val Asp Leu Val Ala Ser Trp Leu Gly
 330 335 340

tcc cac gag cac ggt ccc gtg gtg ctt gat ccc gtc atg atc gcc acc
 1171

Ser His Glu His Gly Pro Val Val Leu Asp Pro Val Met Ile Ala Thr
 345 350 355

agc ggt gat cgc cta ctg gat gcg agc gct gaa gaa tcg ctg cgc cgc
 1219

Ser Gly Asp Arg Leu Leu Asp Ala Ser Ala Glu Glu Ser Leu Arg Arg
 360 365 370

ctg gcc gtg cac gtc gat gtg gtc acc ccg aat atc ccc gaa ctt gcc
 1267

Leu Ala Val His Val Asp Val Val Thr Pro Asn Ile Pro Glu Leu Ala
 375 380 385

gtg ttg tgc gac agt gct cct gcc atc acc atg gat gag gcc att gct
 1315

Val Leu Cys Asp Ser Ala Pro Ala Ile Thr Met Asp Glu Ala Ile Ala
 390 395 400 405

cag gct cag gga ttt gcg cgg act cat gac acc atc gtc att gtc aag
 1363

Gln Ala Gln Gly Phe Ala Arg Thr His Asp Thr Ile Val Ile Val Lys
 410 415 420

ggt gga cat ctg act ggc gcg ctt gct gat aac gct gtc gtg cgc ccc
 1411

Gly Gly His Leu Thr Gly Ala Leu Ala Asp Asn Ala Val Val Arg Pro
 425 430 435

gac ggc tcg gtg ttc cag gtg gaa aac ctg cgt gtc aac acc acc aac
 1459

Asp Gly Ser Val Phe Gln Val Glu Asn Leu Arg Val Asn Thr Thr Asn
 440 445 450

tcc cat ggc aca ggc tgt tcg ctc tct gcg tca ctt gcc acc aag atc
 1507

Ser His Gly Thr Gly Cys Ser Leu Ser Ala Ser Leu Ala Thr Lys Ile
 455 460 465

gcc gcc ggc gaa agc gtg gaa
 1528

Ala Ala Gly Glu Ser Val Glu
 470 475

<210> 1124

<211> 476

<212> PRT

<213> *Corynebacterium glutamicum*

<400> 1124

Met Cys Glu Arg Pro Glu Lys Tyr Val Thr Asp Phe Ser Leu Tyr Leu
 1 5 10 15

Val Thr Asp Pro Val Leu Gly Gly Pro Lys Lys Val Ala Gly Ile
 20 25 30

Val Asp Ser Ala Ile Ser Gly Gly Val Ser Val Val Gln Leu Arg Asp
 35 40 45
 Lys Asn Ser Gly Val Glu Asp Val Arg Ala Ala Ala Lys Glu Leu Lys
 50 55 60
 Glu Leu Cys Asp Ala Arg Gly Val Ala Leu Val Val Asn Asp Tyr Leu
 65 70 75 80
 Asp Ile Ala Val Glu Leu Gly Leu His Leu His Ile Gly Gln Gly Asp
 85 90 95
 Thr Pro Tyr Thr Gln Ala Arg Glu Leu Leu Pro Ala His Leu Glu Leu
 100 105 110
 Gly Leu Ser Ile Glu Asn Leu Asp Gln Leu His Ala Val Ile Ala Gln
 115 120 125
 Cys Ala Glu Thr Gly Val Ala Leu Pro Asp Val Ile Gly Ile Gly Pro
 130 135 140
 Val Ala Ser Thr Ala Thr Lys Pro Asp Ala Ala Pro Ala Leu Gly Val
 145 150 155 160
 Glu Gly Ile Ala Glu Ile Ala Ala Val Ala Gln Asp His Gly Ile Ala
 165 170 175
 Ser Val Ala Ile Gly Gly Val Gly Leu Arg Asn Ala Ala Glu Leu Ala
 180 185 190
 Ala Thr Pro Ile Asp Gly Leu Cys Val Val Ser Glu Ile Met Thr Ala
 195 200 205
 Ala Asn Pro Ala Ala Ala Ala Thr Arg Leu Arg Thr Ala Phe Gln Pro
 210 215 220
 Thr Phe Ser Pro Glu Thr Gln Thr Glu Leu Ser Gln Thr Glu Leu Gln
 225 230 235 240
 Gly Ala Phe Val Asn Ser Pro Ser Ala Pro Arg Val Leu Ser Ile Ala
 245 250 255
 Gly Thr Asp Pro Thr Gly Gly Ala Gly Ile Gln Ala Asp Leu Lys Ser
 260 265 270
 Ile Ala Ala Gly Gly Tyr Gly Met Cys Val Val Thr Ser Leu Val
 275 280 285
 Ala Gln Asn Thr His Gly Val Asn Thr Ile His Thr Pro Pro Leu Thr
 290 295 300
 Phe Leu Glu Glu Gln Leu Glu Ala Val Phe Ser Asp Val Thr Val Asp
 305 310 315 320
 Ala Ile Lys Leu Gly Met Leu Gly Ser Ala Asp Thr Val Asp Leu Val
 325 330 335
 Ala Ser Trp Leu Gly Ser His Glu His Gly Pro Val Val Leu Asp Pro
 340 345 350
 Val Met Ile Ala Thr Ser Gly Asp Arg Leu Leu Asp Ala Ser Ala Glu

355

360

365

Glu Ser Leu Arg Arg Leu Ala Val His Val Asp Val Val Thr Pro Asn
 370 375 380

Ile Pro Glu Leu Ala Val Leu Cys Asp Ser Ala Pro Ala Ile Thr Met
 385 390 395 400

Asp Glu Ala Ile Ala Gln Ala Gln Gly Phe Ala Arg Thr His Asp Thr
 405 410 415

Ile Val Ile Val Lys Gly Gly His Leu Thr Gly Ala Leu Ala Asp Asn
 420 425 430

Ala Val Val Arg Pro Asp Gly Ser Val Phe Gln Val Glu Asn Leu Arg
 435 440 445

Val Asn Thr Thr Asn Ser His Gly Thr Gly Cys Ser Leu Ser Ala Ser
 450 455 460

Leu Ala Thr Lys Ile Ala Ala Gly Glu Ser Val Glu
 465 470 475

<210> 1125

<211> 795

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(772)

<223> RXN01617

<400> 1125

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tgttatggc attgggtcca tcacatgctt gggtggcctt ttg atc cta aag aca 115
 Leu Ile Leu Lys Thr
 1 5

act gga atc acc gtt ttg tcc cgg ttt gat gcg cag gtt atc gct aat 163
 Thr Gly Ile Thr Val Leu Ser Arg Phe Asp Ala Gln Val Ile Ala Asn
 10 15 20

cag att gag gcc gcc acc gca gcg cac gat ctt gat gtg gtg aag atc 211
 Gln Ile Glu Ala Ala Thr Ala Ala His Asp Leu Asp Val Val Lys Ile
 25 30 35

ggg atg ttg ggt act cct gca acg atc gat act gtg gca acc gct ttg 259
 Gly Met Leu Gly Thr Pro Ala Thr Ile Asp Thr Val Ala Thr Ala Leu
 40 45 50

gag gaa aac agc ttc aag cac gtt gtc cta gac ccg gta ctg atc tgc 307
 Glu Glu Asn Ser Phe Lys His Val Val Leu Asp Pro Val Leu Ile Cys
 55 60 65

aag ggc cag gag ccc ggc gca ctt gat act gac act gcc ctt cgc 355
 Lys Gly Gln Glu Pro Gly Ala Ala Leu Asp Thr Asp Thr Ala Leu Arg
 70 75 80 85

| | |
|---|-----|
| gct aag gtg ctg cca cag gca acc gtg gtt act cca aac aac ttc gag | 403 |
| Ala Lys Val Leu Pro Gln Ala Thr Val Val Thr Pro Asn Asn Phe Glu | |
| 90 95 100 | |
| gcc acc acc ctg tct ggc cta gac aag ctg gag acc atc gac gac ctg | 451 |
| Ala Thr Thr Leu Ser Gly Leu Asp Lys Leu Glu Thr Ile Asp Asp Leu | |
| 105 110 115 | |
| aag gaa gca gcc cgc ctc att cat gag caa gga cct cag tac gtc gtt | 499 |
| Lys Glu Ala Ala Arg Leu Ile His Glu Gln Gly Pro Gln Tyr Val Val | |
| 120 125 130 | |
| gtt aag ggt ggc atc gac ttc cca ggc gac aac gct gtg gac gta ctt | 547 |
| Val Lys Gly Gly Ile Asp Phe Pro Gly Asp Asn Ala Val Asp Val Leu | |
| 135 140 145 | |
| ttc gac ggc acc gac tac cac gtg ttc tct gaa cca aag atc ggc gac | 595 |
| Phe Asp Gly Thr Asp Tyr His Val Phe Ser Glu Pro Lys Ile Gly Asp | |
| 150 155 160 165 | |
| gag cgc gtc tcc ggc gct ggc tgt acc ttc gca gct gtc atc acc gca | 643 |
| Glu Arg Val Ser Gly Ala Gly Cys Thr Phe Ala Ala Val Ile Thr Ala | |
| 170 175 180 | |
| gag ctg gcc aag ggc aac tct gcc gtt gat gca gtg acc acc gct aag | 691 |
| Glu Leu Ala Lys Gly Asn Ser Ala Val Asp Ala Val Thr Thr Ala Lys | |
| 185 190 195 | |
| cgc gta gtc acc cgc gca gtg aag gac gct gtc gca tcc aac gca ccg | 739 |
| Arg Val Val Thr Arg Ala Val Lys Asp Ala Val Ala Ser Asn Ala Pro | |
| 200 205 210 | |
| ttt acc tct gtg tgg ttg gcg gaa gac aac aag tagaaatctt aaacaagctc | 792 |
| Phe Thr Ser Val Trp Leu Ala Glu Asp Asn Lys | |
| 215 220 | |
| cct | 795 |
| <210> 1126 | |
| <211> 224 | |
| <212> PRT | |
| <213> Corynebacterium glutamicum | |
| <400> 1126 | |
| Leu Ile Leu Lys Thr Thr Gly Ile Thr Val Leu Ser Arg Phe Asp Ala | |
| 1 5 10 15 | |
| Gln Val Ile Ala Asn Gln Ile Glu Ala Ala Thr Ala Ala His Asp Leu | |
| 20 25 30 | |
| Asp Val Val Lys Ile Gly Met Leu Gly Thr Pro Ala Thr Ile Asp Thr | |
| 35 40 45 | |
| Val Ala Thr Ala Leu Glu Glu Asn Ser Phe Lys His Val Val Leu Asp | |
| 50 55 60 | |
| Pro Val Leu Ile Cys Lys Gly Gln Glu Pro Gly Ala Ala Leu Asp Thr | |
| 65 70 75 80 | |
| Asp Thr Ala Leu Arg Ala Lys Val Leu Pro Gln Ala Thr Val Val Thr | |

| 85 | 90 | 95 |
|---|-----|-----|
| Pro Asn Asn Phe Glu Ala Thr Thr Leu Ser Gly Leu Asp Lys Leu Glu | | |
| 100 | 105 | 110 |
| Thr Ile Asp Asp Leu Lys Glu Ala Ala Arg Leu Ile His Glu Gln Gly | | |
| 115 | 120 | 125 |
| Pro Gln Tyr Val Val Val Lys Gly Gly Ile Asp Phe Pro Gly Asp Asn | | |
| 130 | 135 | 140 |
| Ala Val Asp Val Leu Phe Asp Gly Thr Asp Tyr His Val Phe Ser Glu | | |
| 145 | 150 | 155 |
| | | 160 |
| Pro Lys Ile Gly Asp Glu Arg Val Ser Gly Ala Gly Cys Thr Phe Ala | | |
| 165 | 170 | 175 |
| Ala Val Ile Thr Ala Glu Leu Ala Lys Gly Asn Ser Ala Val Asp Ala | | |
| 180 | 185 | 190 |
| Val Thr Thr Ala Lys Arg Val Val Thr Arg Ala Val Lys Asp Ala Val | | |
| 195 | 200 | 205 |
| Ala Ser Asn Ala Pro Phe Thr Ser Val Trp Leu Ala Glu Asp Asn Lys | | |
| 210 | 215 | 220 |

<210> 1127

<211> 638

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (1)..(615)

<223> FRXA01617

<400> 1127

| | | | |
|---|----|----|----|
| gct aat cag att gag gcc acc gca gcg cac gat ctt gat gtg gtg | 48 | | |
| Ala Asn Gln Ile Glu Ala Ala Thr Ala Ala His Asp Leu Asp Val Val | | | |
| 1 | 5 | 10 | 15 |

| | | |
|---|----|----|
| aag atc ggt atg ttg ggt act cct gca acg atc gat act gtg gca acc | 96 | |
| Lys Ile Gly Met Leu Gly Thr Pro Ala Thr Ile Asp Thr Val Ala Thr | | |
| 20 | 25 | 30 |

| | | |
|---|-----|----|
| gct ttg gag gaa aac agc ttc aag cac gtt gtc cta gac ccg gta ctg | 144 | |
| Ala Leu Glu Glu Asn Ser Phe Lys His Val Val Leu Asp Pro Val Leu | | |
| 35 | 40 | 45 |

| | | |
|---|-----|----|
| atc tgc aag ggc cag gag ccc ggc gcg gca ctt gat act gac act gcc | 192 | |
| Ile Cys Lys Gly Gln Glu Pro Gly Ala Ala Leu Asp Thr Asp Thr Ala | | |
| 50 | 55 | 60 |

| | | | |
|---|-----|----|----|
| ctt cgc gcg aag gtg ctg cca cag gca acc gtt act cca aac aac | 240 | | |
| Leu Arg Ala Lys Val Leu Pro Gln Ala Thr Val Val Thr Pro Asn Asn | | | |
| 65 | 70 | 75 | 80 |

| | |
|---|-----|
| ttc gag gcc acc acc ctg tct ggc cta gac aag ctg gag acc atc gac | 288 |
| Phe Glu Ala Thr Thr Leu Ser Gly Leu Asp Lys Leu Glu Thr Ile Asp | |
| 85 90 95 | |
| gac ctg aag gaa gca gcc cgc ctc att cat gag caa gga cct cag tac | 336 |
| Asp Leu Lys Glu Ala Ala Arg Leu Ile His Glu Gln Gly Pro Gln Tyr | |
| 100 105 110 | |
| gtc gtt gtt aag ggt ggc atc gac ttc cca ggc gac aac gct gtg gac | 384 |
| Val Val Val Lys Gly Gly Ile Asp Phe Pro Gly Asp Asn Ala Val Asp | |
| 115 120 125 | |
| gta ctt ttc gac ggc acc gac tac cac gtg ttc tct gaa cca aag atc | 432 |
| Val Leu Phe Asp Gly Thr Asp Tyr His Val Phe Ser Glu Pro Lys Ile | |
| 130 135 140 | |
| ggc gac gag cgc gtc tcc ggc gct ggc tgt acc ttc gca gct gtc atc | 480 |
| Gly Asp Glu Arg Val Ser Gly Ala Gly Cys Thr Phe Ala Ala Val Ile | |
| 145 150 155 160 | |
| acc gca gag ctg gcc aag ggc aac tct gcc gtt gat gca gtg acc acc | 528 |
| Thr Ala Glu Leu Ala Lys Gly Asn Ser Ala Val Asp Ala Val Thr Thr | |
| 165 170 175 | |
| gct aag cgc gta gtc acc cgc gca gtg aag gac gct gtc gca tcc aac | 576 |
| Ala Lys Arg Val Val Thr Arg Ala Val Lys Asp Ala Val Ala Ser Asn | |
| 180 185 190 | |
| gca ccg ttt acc tct gtg tgg tgg gcg gaa gac aac aag tagaaatctt | 625 |
| Ala Pro Phe Thr Ser Val Trp Leu Ala Glu Asp Asn Lys | |
| 195 200 205 | |
| aaacaagctc cct | 638 |

<210> 1128

<211> 205

<212> PRT

<213> Corynebacterium glutamicum

<400> 1128

| | |
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| Ala Asn Gln Ile Glu Ala Ala Thr Ala Ala His Asp Leu Asp Val Val | |
| 1 5 10 15 | |

| | |
|---|--|
| Lys Ile Gly Met Leu Gly Thr Pro Ala Thr Ile Asp Thr Val Ala Thr | |
| 20 25 30 | |

| | |
|---|--|
| Ala Leu Glu Glu Asn Ser Phe Lys His Val Val Leu Asp Pro Val Leu | |
| 35 40 45 | |

| | |
|---|--|
| Ile Cys Lys Gly Gln Glu Pro Gly Ala Ala Leu Asp Thr Asp Thr Ala | |
| 50 55 60 | |

| | |
|---|--|
| Leu Arg Ala Lys Val Leu Pro Gln Ala Thr Val Val Thr Pro Asn Asn | |
| 65 70 75 80 | |

| | |
|---|--|
| Phe Glu Ala Thr Thr Leu Ser Gly Leu Asp Lys Leu Glu Thr Ile Asp | |
| 85 90 95 | |

| | |
|---|--|
| Asp Leu Lys Glu Ala Ala Arg Leu Ile His Glu Gln Gly Pro Gln Tyr | |
| 100 105 110 | |

Val Val Val Lys Gly Gly Ile Asp Phe Pro Gly Asp Asn Ala Val Asp
 115 120 125

Val Leu Phe Asp Gly Thr Asp Tyr His Val Phe Ser Glu Pro Lys Ile
 130 135 140

Gly Asp Glu Arg Val Ser Gly Ala Gly Cys Thr Phe Ala Ala Val Ile
 145 150 155 160

Thr Ala Glu Leu Ala Lys Gly Asn Ser Ala Val Asp Ala Val Thr Thr
 165 170 175

Ala Lys Arg Val Val Thr Arg Ala Val Lys Asp Ala Val Ala Ser Asn
 180 185 190

Ala Pro Phe Thr Ser Val Trp Leu Ala Glu Asp Asn Lys
 195 200 205

<210> 1129

<211> 792

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(769)

<223> RXC01600

<400> 1129

tgagtacaaa tctcgcccaa cccatgctca tccactgttt tacggcctgg tgaagaccgc 60

tttggagctg cgtgtccacc ctttagatcta caatgtgatc atg gtt tcg aag atg 115
 Met Val Ser Lys Met
 1 5

cac att ccc ggt acc cat gag ttc acg gtg aca gat act gaa ctg ttg 163
 His Ile Pro Gly Thr His Glu Phe Thr Val Thr Asp Thr Glu Leu Leu
 10 15 20

tta gag tcc cca att ttg ggc gtt cgt cga gat tca ttg atc atg ccg 211
 Leu Glu Ser Pro Ile Leu Gly Val Arg Arg Asp Ser Leu Ile Met Pro
 25 30 35

ggt ggt tcc act gcc cgc cgt gaa gtg gtt gaa cac ttt ggg gcg gtc 259
 Gly Gly Ser Thr Ala Arg Arg Glu Val Val Glu His Phe Gly Ala Val
 40 45 50

gca gtg gtt gcc ttt gat ggt gaa aac att gcg atg gtc aag cag tac 307
 Ala Val Val Ala Phe Asp Gly Glu Asn Ile Ala Met Val Lys Gln Tyr
 55 60 65

cgt cgc agc gtg ggg gat tcc ttg tgg gag ctg cct gca ggt ttg ttg 355
 Arg Arg Ser Val Gly Asp Ser Leu Trp Glu Leu Pro Ala Gly Leu Leu
 70 75 80 85

gat att gct gat gag gat gaa ctc acg ggc gcg cag cgc gag ctc atg 403
 Asp Ile Ala Asp Glu Asp Glu Leu Thr Gly Ala Gln Arg Glu Leu Met
 90 95 100

| | |
|---|-----|
| gag gag gct ggt ttg gag gcc agt gag tgg tcc gtg ctc act gat ttg | 451 |
| Glu Glu Ala Gly Leu Glu Ala Ser Glu Trp Ser Val Leu Thr Asp Leu | |
| 105 110 115 | |
| att acc tcg cct ggt ttc tgc gat gaa gcg gtg cgt gtc ttt cta gcc | 499 |
| Ile Thr Ser Pro Gly Phe Cys Asp Glu Ala Val Arg Val Phe Leu Ala | |
| 120 125 130 | |
| cga ggc ctc aca aag gtt gag cgc ccg aag gtt atg ggc gat gaa gaa | 547 |
| Arg Gly Leu Thr Lys Val Glu Arg Pro Lys Val Met Gly Asp Glu Glu | |
| 135 140 145 | |
| gcg gac atg att aac cag tgg gtt ccg cta cat gag gca gtg gga atg | 595 |
| Ala Asp Met Ile Asn Gln Trp Val Pro Leu His Glu Ala Val Gly Met | |
| 150 155 160 165 | |
| gtg ttt agt ggc cag ttg gtt aac tcc att gcc att gcg ggt gtc atg | 643 |
| Val Phe Ser Gly Gln Leu Val Asn Ser Ile Ala Ile Ala Gly Val Met | |
| 170 175 180 | |
| gct gct gat gct gtg att gcg ggt cgt gcg tct gcg cgt gcc gtc acc | 691 |
| Ala Ala Asp Ala Val Ile Ala Gly Arg Ala Ser Ala Arg Ala Val Thr | |
| 185 190 195 | |
| gcg ccg ttt acc tat cgc cct acg gcg ttg gcg cag cgt cga aaa gcg | 739 |
| Ala Pro Phe Thr Tyr Arg Pro Thr Ala Leu Ala Gln Arg Arg Lys Ala | |
| 200 205 210 | |
| cac ggc att gtt cct gac atg aaa aaa cta tgaaggctcg cgtttagcg | 789 |
| His Gly Ile Val Pro Asp Met Lys Lys Leu | |
| 215 220 | |
| aaa | 792 |

<210> 1130

<211> 223

<212> PRT

<213> Corynebacterium glutamicum

<400> 1130

| | |
|---|--|
| Met Val Ser Lys Met His Ile Pro Gly Thr His Glu Phe Thr Val Thr | |
| 1 5 10 15 | |

| | |
|---|--|
| Asp Thr Glu Leu Leu Glu Ser Pro Ile Leu Gly Val Arg Arg Asp | |
| 20 25 30 | |

| | |
|---|--|
| Ser Leu Ile Met Pro Gly Gly Ser Thr Ala Arg Arg Glu Val Val Glu | |
| 35 40 45 | |

| | |
|---|--|
| His Phe Gly Ala Val Ala Val Val Ala Phe Asp Gly Glu Asn Ile Ala | |
| 50 55 60 | |

| | |
|---|--|
| Met Val Lys Gln Tyr Arg Arg Ser Val Gly Asp Ser Leu Trp Glu Leu | |
| 65 70 75 80 | |

| | |
|---|--|
| Pro Ala Gly Leu Leu Asp Ile Ala Asp Glu Asp Glu Leu Thr Gly Ala | |
| 85 90 95 | |

| | |
|---|--|
| Gln Arg Glu Leu Met Glu Glu Ala Gly Leu Glu Ala Ser Glu Trp Ser | |
| 100 105 110 | |

Val Leu Thr Asp Leu Ile Thr Ser Pro Gly Phe Cys Asp Glu Ala Val
 115 120 125

Arg Val Phe Leu Ala Arg Gly Leu Thr Lys Val Glu Arg Pro Lys Val
 130 135 140

Met Gly Asp Glu Glu Ala Asp Met Ile Asn Gln Trp Val Pro Leu His
 145 150 155 160

Glu Ala Val Gly Met Val Phe Ser Gly Gln Leu Val Asn Ser Ile Ala
 165 170 175

Ile Ala Gly Val Met Ala Ala Asp Ala Val Ile Ala Gly Arg Ala Ser
 180 185 190

Ala Arg Ala Val Thr Ala Pro Phe Thr Tyr Arg Pro Thr Ala Leu Ala
 195 200 205

Gln Arg Arg Lys Ala His Gly Ile Val Pro Asp Met Lys Lys Leu
 210 215 220

<210> 1131

<211> 726

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(703)

<223> RXC01622

<400> 1131

aaggcgtggg cgttttgaa ggagcttcgt ttggagcgcg gtcctttgga tcgtgaagtt 60

gccatcgccag agctgaagag ctgggtggaa ggagaaaaaca'atg agt gat ttt tat 115
 Met Ser Asp Phe Tyr
 1 5

gcc gac agg ttg ttt aac gcg atg gag cgc aat gag gta gct cca ggc 163
 Ala Asp Arg Leu Phe Asn Ala Met Glu Arg Asn Glu Val Ala Pro Gly
 10 15 20

atg ttg ttg gtg gct ccc gat atg gcg tcg gag gat ttt gag cgc 211
 Met Leu Leu Val Ala Ala Pro Asp Met Ala Ser Glu Asp Phe Glu Arg
 25 30 35

agc atc gtg ttg atc atc gag cat tct cct gcc acc act ttt ggt gtg 259
 Ser Ile Val Ile Ile Glu His Ser Pro Ala Thr Thr Phe Gly Val
 40 45 50

aac att tct tca cgt tcc gat gtt gct gtg gcc aat gtg ttg ccc gag 307
 Asn Ile Ser Ser Arg Ser Asp Val Ala Val Ala Asn Val Leu Pro Glu
 55 60 65

tgg gtg gac ctc acc tcg aag cca cag gca ctg tac atc ggt ggg ccg 355
 Trp Val Asp Leu Thr Ser Lys Pro Gln Ala Leu Tyr Ile Gly Gly Pro
 70 75 80 85

ttg agc cag cag gct gtg gtt ggt ttg ggc gtg acc aag ccg ggc gtg 403

| | | | | |
|---|-----|-----|-----|-----|
| Leu Ser Gln Gln Ala Val Val Gly Leu Gly Val Thr Lys Pro Gly Val | 90 | 95 | 100 | |
| gat att gaa aat tcc acc agc ttc aac aag ctc gcc aac cgc ctg gtg | | | | 451 |
| Asp Ile Glu Asn Ser Thr Ser Phe Asn Lys Leu Ala Asn Arg Leu Val | 105 | 110 | 115 | |
| cac gtg gat ctg cgt tct gca cct gaa gat gtg gct gat gat ctt gag | | | | 499 |
| His Val Asp Leu Arg Ser Ala Pro Glu Asp Val Ala Asp Asp Leu Glu | 120 | 125 | 130 | |
| ggc atg cgc ttt ttt gcg ggc tac gcg gag tgg gct ccg ggc cag ctc | | | | 547 |
| Gly Met Arg Phe Phe Ala Gly Tyr Ala Glu Trp Ala Pro Gly Gln Leu | 135 | 140 | 145 | |
| aac gag gaa att gag cag ggt gat tgg ttc gtc aca cct gcg ttg ccg | | | | 595 |
| Asn Glu Glu Ile Glu Gln Gly Asp Trp Phe Val Thr Pro Ala Leu Pro | 150 | 155 | 160 | 165 |
| tcg gac att atc gcg ccg ggc cgc gtc gat att tgg ggc gac gtg atg | | | | 643 |
| Ser Asp Ile Ile Ala Pro Gly Arg Val Asp Ile Trp Gly Asp Val Met | 170 | 175 | 180 | |
| cgt cga caa gca atg cct ttg ccg ttg tat tcc acg ttt ccg tcg gac | | | | 691 |
| Arg Arg Gln Ala Met Pro Leu Pro Leu Tyr Ser Thr Phe Pro Ser Asp | 185 | 190 | 195 | |
| cct tca gat aat tagatgagtt ccgaaaattt aaa | | | | 726 |
| Pro Ser Asp Asn | | | | |
| 200 | | | | |

<210> 1132

<211> 201

<212> PRT

<213> Corynebacterium glutamicum

<400> 1132

| | | | | |
|---|---|---|----|----|
| Met Ser Asp Phe Tyr Ala Asp Arg Leu Phe Asn Ala Met Glu Arg Asn | 1 | 5 | 10 | 15 |
|---|---|---|----|----|

| | | | |
|---|----|----|----|
| Glu Val Ala Pro Gly Met Leu Leu Val Ala Ala Pro Asp Met Ala Ser | 20 | 25 | 30 |
|---|----|----|----|

| | | | |
|---|----|----|----|
| Glu Asp Phe Glu Arg Ser Ile Val Leu Ile Ile Glu His Ser Pro Ala | 35 | 40 | 45 |
|---|----|----|----|

| | | | |
|---|----|----|----|
| Thr Thr Phe Gly Val Asn Ile Ser Ser Arg Ser Asp Val Ala Val Ala | 50 | 55 | 60 |
|---|----|----|----|

| | | | | |
|---|----|----|----|----|
| Asn Val Leu Pro Glu Trp Val Asp Leu Thr Ser Lys Pro Gln Ala Leu | 65 | 70 | 75 | 80 |
|---|----|----|----|----|

| | | | |
|---|----|----|----|
| Tyr Ile Gly Gly Pro Leu Ser Gln Gln Ala Val Val Gly Leu Gly Val | 85 | 90 | 95 |
|---|----|----|----|

| | | | |
|---|-----|-----|-----|
| Thr Lys Pro Gly Val Asp Ile Glu Asn Ser Thr Ser Phe Asn Lys Leu | 100 | 105 | 110 |
|---|-----|-----|-----|

| | | | |
|---|-----|-----|-----|
| Ala Asn Arg Leu Val His Val Asp Leu Arg Ser Ala Pro Glu Asp Val | 115 | 120 | 125 |
|---|-----|-----|-----|

Ala Asp Asp Leu Glu Gly Met Arg Phe Phe Ala Gly Tyr Ala Glu Trp
 130 135 140

Ala Pro Gly Gln Leu Asn Glu Glu Ile Glu Gln Gly Asp Trp Phe Val
 145 150 155 160

Thr Pro Ala Leu Pro Ser Asp Ile Ile Ala Pro Gly Arg Val Asp Ile
 165 170 175

Trp Gly Asp Val Met Arg Arg Gln Ala Met Pro Leu Pro Leu Tyr Ser
 180 185 190

Thr Phe Pro Ser Asp Pro Ser Asp Asn
 195 200

<210> 1133

<211> 1827

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (101)..(1804)

<223> RXC00128

<400> 1133

ccattttccg tttggtcttg cctaaagaac cgcatggaaa ttatcgtcaa gcaccgatcc 60

cgttgatcgc tccagagaca ccgtggaaag gggagcagca gtg agt aaa att tcg 115
 Val Ser Lys Ile Ser
 1 5

acg aaa ctg aag gcc ctc acc gcg gtg ctg tct gtg acc act ctg gtg 163
 Thr Lys Leu Lys Ala Leu Thr Ala Val Leu Ser Val Thr Thr Leu Val
 10 15 20

gct ggg tgt tcc acg ctt ccg cag aac acg gat ccg caa gtg ctg cgc 211
 Ala Gly Cys Ser Thr Leu Pro Gln Asn Thr Asp Pro Gln Val Leu Arg
 25 30 35

tca ttt tcc ggg tcc caa agc aca caa gag ata gca ggg ccg acc ccg 259
 Ser Phe Ser Gly Ser Gln Ser Thr Gln Glu Ile Ala Gly Pro Thr Pro
 40 45 50

aat caa gat ccg gat ttg ttg atc cgc ggc ttc ttc agc gca ggt gcg 307
 Asn Gln Asp Pro Asp Leu Leu Ile Arg Gly Phe Phe Ser Ala Gly Ala
 55 60 65

tat ccg act cag cag tat gaa gcg gcg aag gcg tat ctg acg gaa ggg 355
 Tyr Pro Thr Gln Gln Tyr Glu Ala Ala Lys Ala Tyr Leu Thr Glu Gly
 70 75 80 85

acg cgc agc acg tgg aat ccg gct gcg tcg act cgt att ttg gat cgc 403
 Thr Arg Ser Thr Trp Asn Pro Ala Ala Ser Thr Arg Ile Leu Asp Arg
 90 95 100

att gat ctg aac act ctg cca ggt tcg acg aat gcg gaa cga acg att 451
 Ile Asp Leu Asn Thr Leu Pro Gly Ser Thr Asn Ala Glu Arg Thr Ile
 105 110 115

| | |
|---|-----|
| gcg atc cgt gga acg cag gtc gga acg ttg ctc agc ggt ggc gtg tat | 499 |
| Ala Ile Arg Gly Thr Gln Val Gly Thr Leu Leu Ser Gly Gly Val Tyr | |
| 120 125 130 | |
| cag ccg gag aat gcg gag ttt gaa gct gag atc acg atg cgt cgg gaa | 547 |
| Gln Pro Glu Asn Ala Glu Phe Glu Ala Glu Ile Thr Met Arg Arg Glu | |
| 135 140 145 | |
| gat ggg gag tgg cgt atc gat gct ttg ccg gac ggg att tta tta gag | 595 |
| Asp Gly Glu Trp Arg Ile Asp Ala Leu Pro Asp Gly Ile Leu Leu Glu | |
| 150 155 160 165 | |
| aga aac gat ctg cgg aac cat tac act ccg cac gat gtg tat ttc ttt | 643 |
| Arg Asn Asp Leu Arg Asn His Tyr Thr Pro His Asp Val Tyr Phe Phe | |
| 170 175 180 | |
| gat cct tct ggc cag gtg ttg gtg ggg gat ccg cgt tgg ttg ttc aat | 691 |
| Asp Pro Ser Gly Gln Val Leu Val Gly Asp Arg Arg Trp Leu Phe Asn | |
| 185 190 195 | |
| gag tcg cag tcg atg tcc acg gtg ctg atg gcc ctt ctg gtt aat ggt | 739 |
| Glu Ser Gln Ser Met Ser Thr Val Leu Met Ala Leu Leu Val Asn Gly | |
| 200 205 210 | |
| cct tcg ccg gca att tct cct ggt gtg gtc aat cag ctg tcc acg gat | 787 |
| Pro Ser Pro Ala Ile Ser Pro Gly Val Val Asn Gln Leu Ser Thr Asp | |
| 215 220 225 | |
| gcg tcg ttc gtg ggg ttc aat gat ggg gag tat cag ttc act ggt ttg | 835 |
| Ala Ser Phe Val Gly Phe Asn Asp Gly Glu Tyr Gln Phe Thr Gly Leu | |
| 230 235 240 245 | |
| gga aat ttg gat gat gat gcg cgt ttg cgt ttc gcc gcc cag gcc gtg | 883 |
| Gly Asn Leu Asp Asp Asp Ala Arg Leu Arg Phe Ala Ala Gln Ala Val | |
| 250 255 260 | |
| tgg acg ttg gcg cat gct gat gtc gca ggc ccc tac act ttg gtc gct | 931 |
| Trp Thr Leu Ala His Ala Asp Val Ala Gly Pro Tyr Thr Leu Val Ala | |
| 265 270 275 | |
| gac ggc gcg ccg ttg ctg tcg gag ttc cca acg ctc acc acc gat gac | 979 |
| Asp Gly Ala Pro Leu Leu Ser Glu Phe Pro Thr Leu Thr Thr Asp Asp | |
| 280 285 290 | |
| ctc gcc gaa tac aac cca gag gct tac acc aac acg gtg tcc acg ttg | |
| 1027 | |
| Leu Ala Glu Tyr Asn Pro Glu Ala Tyr Thr Asn Thr Val Ser Thr Leu | |
| 295 300 305 | |
| ttt gcg ttg cag gat gga tcg ttg tcg agg gtc agt tcc ggc aat gtg | |
| 1075 | |
| Phe Ala Leu Gln Asp Gly Ser Leu Ser Arg Val Ser Ser Gly Asn Val | |
| 310 315 320 325 | |
| agt cca cta cag ggc att tgg agc ggt gga gat atc gat tct gca gcg | |
| 1123 | |
| Ser Pro Leu Gln Gly Ile Trp Ser Gly Gly Asp Ile Asp Ser Ala Ala | |
| 330 335 340 | |

att tcc tcc tcc gcc aat gtg gtg gca gcg gta cgc cac gaa aac aac
 1171
 Ile Ser Ser Ser Ala Asn Val Val Ala Ala Val Arg His Glu Asn Asn
 345 350 355

 gag gca gtg ctt act gtt ggc tcc atg gaa ggc gtg act tca gat gcg
 1219
 Glu Ala Val Leu Thr Val Gly Ser Met Glu Gly Val Thr Ser Asp Ala
 360 365 370

 ttg agg agt gaa acg atc act cgt ccc acc ttt gaa tac gac gtc agt
 1267
 Leu Arg Ser Glu Thr Ile Thr Arg Pro Thr Phe Glu Tyr Ala Ser Ser
 375 380 385

 ggg ttg tgg gct gtg gat ggg gag acg cct gtc cga gtc gca cga
 1315
 Gly Leu Trp Ala Val Val Asp Gly Glu Thr Pro Val Arg Val Ala Arg
 390 395 400 405

 tcg gca aca acc ggt gag ctc gtc cag acg gag gac gag att gtg ctg
 1363
 Ser Ala Thr Thr Gly Glu Leu Val Gln Thr Glu Ala Glu Ile Val Leu
 410 415 420

 cca agg gat gtg acg ggt ccg atc tct gaa ttc caa ctg tca cga act
 1411
 Pro Arg Asp Val Thr Gly Pro Ile Ser Glu Phe Gln Leu Ser Arg Thr
 425 430 435

 ggg gtc cgg gcc gcc atg atc att gaa ggc aag gtg tac gtg ggc gtc
 1459
 Gly Val Arg Ala Ala Met Ile Ile Glu Gly Lys Val Tyr Val Gly Val
 440 445 450

 gta acg cgt cct ggt ccg ggc gag cgg cgc gtg aca aat atc acg gag
 1507
 Val Thr Arg Pro Gly Pro Gly Glu Arg Arg Val Thr Asn Ile Thr Glu
 455 460 465

 gtg gcg ccg agc ttg ggc gag gcg gcg ctg tgc atc aac tgg cgc cca
 1555
 Val Ala Pro Ser Leu Gly Glu Ala Ala Leu Ser Ile Asn Trp Arg Pro
 470 475 480 485

 gac ggc att ttg ctt gtg ggc acg tca att cca gag acg ccg ctg tgg
 1603
 Asp Gly Ile Leu Leu Val Gly Thr Ser Ile Pro Glu Thr Pro Leu Trp
 490 495 500

 cgc gtc gag cag gac gga tcg gcg att tcg tcg atg ccg acg ggg aat
 1651
 Arg Val Glu Gln Asp Gly Ser Ala Ile Ser Ser Met Pro Ser Gly Asn
 505 510 515

 ctc agc gcg ccg gtg gtc gca agt tcc gcg acg acg gtc tac
 1699
 Leu Ser Ala Pro Val Val Ala Val Ala Ser Ser Ala Thr Thr Val Tyr
 520 525 530

gtc act gat tcg cat gcg atg ctt cag ctg ccg act gcc gat aat gat
 1747
 Val Thr Asp Ser His Ala Met Leu Gln Leu Pro Thr Ala Asp Asn Asp
 535 540 545

att tgg cgc gag gtg ccc ggt ttg ctg ggc acg cgt gcg gcg ccg gtg
 1795
 Ile Trp Arg Glu Val Pro Gly Leu Leu Gly Thr Arg Ala Ala Pro Val
 550 555 560 565

gtt gcg tac tcatggagct gttctcccg cgc
 1827
 Val Ala Tyr

<210> 1134
 <211> 568
 <212> PRT
 <213> *Corynebacterium glutamicum*

<400> 1134
 Val Ser Lys Ile Ser Thr Lys Leu Lys Ala Leu Thr Ala Val Leu Ser
 1 5 10 15

Val Thr Thr Leu Val Ala Gly Cys Ser Thr Leu Pro Gln Asn Thr Asp
 20 25 30

Pro Gln Val Leu Arg Ser Phe Ser Gly Ser Gln Ser Thr Gln Glu Ile
 35 40 45

Ala Gly Pro Thr Pro Asn Gln Asp Pro Asp Leu Leu Ile Arg Gly Phe
 50 55 60

Phe Ser Ala Gly Ala Tyr Pro Thr Gln Gln Tyr Glu Ala Ala Lys Ala
 65 70 75 80

Tyr Leu Thr Glu Gly Thr Arg Ser Thr Trp Asn Pro Ala Ala Ser Thr
 85 90 95

Arg Ile Leu Asp Arg Ile Asp Leu Asn Thr Leu Pro Gly Ser Thr Asn
 100 105 110

Ala Glu Arg Thr Ile Ala Ile Arg Gly Thr Gln Val Gly Thr Leu Leu
 115 120 125

Ser Gly Gly Val Tyr Gln Pro Glu Asn Ala Glu Phe Glu Ala Glu Ile
 130 135 140

Thr Met Arg Arg Glu Asp Gly Glu Trp Arg Ile Asp Ala Leu Pro Asp
 145 150 155 160

Gly Ile Leu Leu Glu Arg Asn Asp Leu Arg Asn His Tyr Thr Pro His
 165 170 175

Asp Val Tyr Phe Phe Asp Pro Ser Gly Gln Val Leu Val Gly Asp Arg
 180 185 190

Arg Trp Leu Phe Asn Glu Ser Gln Ser Met Ser Thr Val Leu Met Ala
 195 200 205

Leu Leu Val Asn Gly Pro Ser Pro Ala Ile Ser Pro Gly Val Val Asn
 210 215 220
 Gln Leu Ser Thr Asp Ala Ser Phe Val Gly Phe Asn Asp Gly Glu Tyr
 225 230 235 240
 Gln Phe Thr Gly Leu Gly Asn Leu Asp Asp Asp Ala Arg Leu Arg Phe
 245 250 255
 Ala Ala Gln Ala Val Trp Thr Leu Ala His Ala Asp Val Ala Gly Pro
 260 265 270
 Tyr Thr Leu Val Ala Asp Gly Ala Pro Leu Leu Ser Glu Phe Pro Thr
 275 280 285
 Leu Thr Thr Asp Asp Leu Ala Glu Tyr Asn Pro Glu Ala Tyr Thr Asn
 290 295 300
 Thr Val Ser Thr Leu Phe Ala Leu Gln Asp Gly Ser Leu Ser Arg Val
 305 310 315 320
 Ser Ser Gly Asn Val Ser Pro Leu Gln Gly Ile Trp Ser Gly Gly Asp
 325 330 335
 Ile Asp Ser Ala Ala Ile Ser Ser Ala Asn Val Val Ala Ala Val
 340 345 350
 Arg His Glu Asn Asn Glu Ala Val Leu Thr Val Gly Ser Met Glu Gly
 355 360 365
 Val Thr Ser Asp Ala Leu Arg Ser Glu Thr Ile Thr Arg Pro Thr Phe
 370 375 380
 Glu Tyr Ala Ser Ser Gly Leu Trp Ala Val Val Asp Gly Glu Thr Pro
 385 390 395 400
 Val Arg Val Ala Arg Ser Ala Thr Thr Gly Glu Leu Val Gln Thr Glu
 405 410 415
 Ala Glu Ile Val Leu Pro Arg Asp Val Thr Gly Pro Ile Ser Glu Phe
 420 425 430
 Gln Leu Ser Arg Thr Gly Val Arg Ala Ala Met Ile Ile Glu Gly Lys
 435 440 445
 Val Tyr Val Gly Val Val Thr Arg Pro Gly Pro Gly Glu Arg Arg Val
 450 455 460
 Thr Asn Ile Thr Glu Val Ala Pro Ser Leu Gly Glu Ala Ala Leu Ser
 465 470 475 480
 Ile Asn Trp Arg Pro Asp Gly Ile Leu Leu Val Gly Thr Ser Ile Pro
 485 490 495
 Glu Thr Pro Leu Trp Arg Val Glu Gln Asp Gly Ser Ala Ile Ser Ser
 500 505 510
 Met Pro Ser Gly Asn Leu Ser Ala Pro Val Val Ala Val Ala Ser Ser
 515 520 525
 Ala Thr Thr Val Tyr Val Thr Asp Ser His Ala Met Leu Gln Leu Pro

530

535

540

Thr Ala Asp Asn Asp Ile Trp Arg Glu Val Pro Gly Leu Leu Gly Thr
 545 550 555 560

Arg Ala Ala Pro Val Val Ala Tyr
 565

<210> 1135

<211> 555

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(532)

<223> RXC01709

<400> 1135

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gaaatttaggt gtcgatgcag caatacgaa ctttgc当地 gtg ttt gaa caa gct 115
 Val Phe Glu Gln Ala
 1 5

ctc ggg ctc acc acc ctt gca caa aca gct gga gcg ggc gca gcg ggg 163
 Leu Gly Leu Thr Thr Leu Ala Gln Thr Ala Gly Ala Gly Ala Gly
 10 15 20

ggc ttg ggt ttc atg gca atg gcg ttg ttg tct gca ggg atg cgc tcc 211
 Gly Leu Gly Phe Met Ala Met Ala Leu Leu Ser Ala Gly Met Arg Ser
 25 30 35

ggc gtg gac atg att ctt aat gaa acc ggg ggt gaa aag atg ctt gca 259
 Gly Val Asp Met Ile Leu Asn Glu Thr Gly Gly Glu Lys Met Leu Ala
 40 45 50

cag gca gat tta gtc atc act gga gaa gga cgc att gat gca cag acc 307
 Gln Ala Asp Leu Val Ile Thr Gly Glu Gly Arg Ile Asp Ala Gln Thr
 55 60 65

ctc agc ggg aaa gct cct act gga atc gcc aaa cgg gca cgt gcg aaa 355
 Leu Ser Gly Lys Ala Pro Thr Gly Ile Ala Lys Arg Ala Arg Ala Lys
 70 75 80 85

gga att cca gta ctg gcg gtt tgg cag agc cta ttg ggt cca gca 403
 Gly Ile Pro Val Leu Ala Val Cys Gly Gln Ser Leu Leu Gly Pro Ala
 90 95 100

atc tca aat gag cta ttt gaa gac atc tac agc ttt acc gat ttc gaa 451
 Ile Ser Asn Glu Leu Phe Glu Asp Ile Tyr Ser Phe Thr Asp Phe Glu
 105 110 115

tct gac atc aat gaa tgc att cga aac ccg ctc cca att ttg gaa ggt 499
 Ser Asp Ile Asn Glu Cys Ile Arg Asn Pro Leu Pro Ile Leu Glu Gly
 120 125 130

atc ggt ttt aac atc gcc aaa cat cat ctg agt tagcgatatt tcagcaaacc 552
 Ile Gly Phe Asn Ile Ala Lys His His Leu Ser
 135 140

gat

555

<210> 1136
 <211> 144
 <212> PRT
 <213> *Corynebacterium glutamicum*

<400> 1136
 Val Phe Glu Gln Ala Leu Gly Leu Thr Thr Leu Ala Gln Thr Ala Gly
 1 5 10 15

Ala Gly Ala Ala Gly Gly Leu Gly Phe Met Ala Met Ala Leu Leu Ser
 20 25 30

Ala Gly Met Arg Ser Gly Val Asp Met Ile Leu Asn Glu Thr Gly Gly
 35 40 45

Glu Lys Met Leu Ala Gln Ala Asp Leu Val Ile Thr Gly Glu Gly Arg
 50 55 60

Ile Asp Ala Gln Thr Leu Ser Gly Lys Ala Pro Thr Gly Ile Ala Lys
 65 70 75 80

Arg Ala Arg Ala Lys Gly Ile Pro Val Leu Ala Val Cys Gly Gln Ser
 85 90 95.

Leu Leu Gly Pro Ala Ile Ser Asn Glu Leu Phe Glu Asp Ile Tyr Ser
 100 105 110

Phe Thr Asp Phe Glu Ser Asp Ile Asn Glu Cys Ile Arg Asn Pro Leu
 115 120 125

Pro Ile Leu Glu Gly Ile Gly Phe Asn Ile Ala Lys His His Leu Ser
 130 135 140

<210> 1137
 <211> 898
 <212> DNA
 <213> *Corynebacterium glutamicum*

<220>
 <221> CDS
 <222> (101)..(898)
 <223> RXC02207

<400> 1137
 gaatcggtga ctttgccaaac accaatcaca caagcccttg atgatgtctc cctgtgactt 60
 ggtccaatta cattcaactgg taatctgaaa ccttgtgaat atg cgc cgt cga tcc 115
 Met Arg Arg Arg Ser
 1 5

cgt gtg tcc cgt ttg ctt ccc gcc aca gct ttg ctg gcc tca act gca 163
 Arg Val Ser Arg Leu Leu Pro Ala Thr Ala Leu Ala Ser Thr Ala
 10 15 20

| | | | | |
|--|-----|-----|-----|-----|
| ctt ctt tta agt gca tgt acg caa ggg gta acg gac tcc ccg gat atg Leu Leu Leu Ser Ala Cys Thr Gln Gly Val Thr Asp Ser Pro Asp Met | 25 | 30 | 35 | 211 |
| ggc aag gca act ccc gct gtc tcc ccc gca gca agc aac ccg gat ggc Gly Lys Ala Thr Pro Ala Val Ser Pro Ala Ala Ser Asn Pro Asp Gly | 40 | 45 | 50 | 259 |
| caa gta att gag ttc ggc aac atc act gac atg gaa gtc act gat ggt Gln Val Ile Glu Phe Gly Asn Ile Thr Asp Met Glu Val Thr Asp Gly | 55 | 60 | 65 | 307 |
| gac atc ctc ggt gta cgc acc gaa gac gca ctc gct att ggt aca gtc Asp Ile Leu Gly Val Arg Thr Glu Asp Ala Leu Ala Ile Gly Thr Val | 70 | 75 | 80 | 355 |
| tcc gac ttc gaa gcg ggt agc cag gtg gaa ctg gac gtc gat aag caa Ser Asp Phe Glu Ala Gly Ser Gln Val Glu Leu Asp Val Asp Lys Gln | 90 | 95 | 100 | 403 |
| tgc ggc gac ctg acc gca acc ggc ggc act ttc gtg ctc ccc tgc gcc Cys Gly Asp Leu Thr Ala Thr Gly Gly Thr Phe Val Leu Pro Cys Ala | 105 | 110 | 115 | 451 |
| gat ggc gtt tat ttg att gat gcc aag gac ccg gat ctg gat gag ttg Asp Gly Val Tyr Leu Ile Asp Ala Lys Asp Pro Asp Leu Asp Glu Leu | 120 | 125 | 130 | 499 |
| cgt gca act gac aag cca gtc acg gtg gca gcc ttg acc agc gat gat Arg Ala Thr Asp Lys Pro Val Thr Val Ala Ala Leu Thr Ser Asp Asp | 135 | 140 | 145 | 547 |
| cag ctt ctg gtg ggc aat ggt gaa gat gaa gaa ctc acc atc tac cgc Gln Leu Leu Val Gly Asn Gly Glu Asp Glu Glu Leu Thr Ile Tyr Arg | 150 | 155 | 160 | 595 |
| gag ggc gaa gag cca gaa acc ttc acc gtc gcg ggt ccc aat acc cag Glu Gly Glu Glu Pro Glu Thr Phe Thr Val Ala Gly Pro Asn Thr Gln | 170 | 175 | 180 | 643 |
| ctc atc gcc gtt cct gtc att gat cgc cac gac gcc gtt gtg cgc acc Leu Ile Ala Val Pro Val Ile Asp Arg His Asp Ala Val Val Arg Thr | 185 | 190 | 195 | 691 |
| tgg aac gaa aac acc acg att caa gat gtg gac tac ccc aac gac cgt Trp Asn Glu Asn Thr Thr Ile Gln Asp Val Asp Tyr Pro Asn Asp Arg | 200 | 205 | 210 | 739 |
| gaa ggc gcg acc ctt cgc gtg gga ctc ggc gtt ggt caa atg gct ggt Glu Gly Ala Thr Leu Arg Val Gly Leu Gly Val Gly Gln Met Ala Gly | 215 | 220 | 225 | 787 |
| ggc gaa gac ggc ctg ctg gtg gtc tct gat gaa atg ggt ggc caa att Gly Glu Asp Gly Leu Leu Val Val Ser Asp Glu Met Gly Gly Gln Ile | 230 | 235 | 240 | 835 |
| gcc atc tac aac gct gat gat gtc atc cga ctt caa aat gac cgc ccc Ala Ile Tyr Asn Ala Asp Asp Val Ile Arg Leu Gln Asn Asp Arg Pro | 250 | 255 | 260 | 883 |

cac cga cga gga acc
 His Arg Arg Gly Thr
 265

898

<210> 1138
 <211> 266
 <212> PRT
 <213> Corynebacterium glutamicum

<400> 1138
 Met Arg Arg Arg Ser Arg Val Ser Arg Leu Leu Pro Ala Thr Ala Leu
 1 5 10 15

Leu Ala Ser Thr Ala Leu Leu Ser Ala Cys Thr Gln Gly Val Thr
 20 25 30

Asp Ser Pro Asp Met Gly Lys Ala Thr Pro Ala Val Ser Pro Ala Ala
 35 40 45

Ser Asn Pro Asp Gly Gln Val Ile Glu Phe Gly Asn Ile Thr Asp Met
 50 55 60

Glu Val Thr Asp Gly Asp Ile Leu Gly Val Arg Thr Glu Asp Ala Leu
 65 70 75 80

Ala Ile Gly Thr Val Ser Asp Phe Glu Ala Gly Ser Gln Val Glu Leu
 85 90 95

Asp Val Asp Lys Gln Cys Gly Asp Leu Thr Ala Thr Gly Thr Phe
 100 105 110

Val Leu Pro Cys Ala Asp Gly Val Tyr Leu Ile Asp Ala Lys Asp Pro
 115 120 125

Asp Leu Asp Glu Leu Arg Ala Thr Asp Lys Pro Val Thr Val Ala Ala
 130 135 140

Leu Thr Ser Asp Asp Gln Leu Leu Val Gly Asn Gly Glu Asp Glu Glu
 145 150 155 160

Leu Thr Ile Tyr Arg Glu Gly Glu Pro Glu Thr Phe Thr Val Ala
 165 170 175

Gly Pro Asn Thr Gln Leu Ile Ala Val Pro Val Ile Asp Arg His Asp
 180 185 190

Ala Val Val Arg Thr Trp Asn Glu Asn Thr Thr Ile Gln Asp Val Asp
 195 200 205

Tyr Pro Asn Asp Arg Glu Gly Ala Thr Leu Arg Val Gly Leu Gly Val
 210 215 220

Gly Gln Met Ala Gly Gly Glu Asp Gly Leu Leu Val Val Ser Asp Glu
 225 230 235 240

Met Gly Gly Gln Ile Ala Ile Tyr Asn Ala Asp Asp Val Ile Arg Leu
 245 250 255

Gln Asn Asp Arg Pro His Arg Arg Gly Thr
 260 265

<210> 1139
 <211> 891
 <212> DNA
 <213> *Corynebacterium glutamicum*

<220>
 <221> CDS
 <222> (101)..(868)
 <223> RXA00347

<400> 1139

tcggccagca atccgcttgg tgcctggat cgccggaca tcttaaggtg ccagggcttt 60

aaagtgccag gggttctgtg ggatccgtac actggttccc atg act ttg act att 115
 Met Thr Leu Thr Ile
 1 5

gag gaa atc gcc aag acc aaa aag ctt ttg gtt gtg tcc gat ttt gat 163
 Glu Glu Ile Ala Lys Thr Lys Lys Leu Leu Val Val Ser Asp Phe Asp
 10 15 20

gga acc atc gca gga ttt agc aag gac gct tac aac gtt cct atc aac 211
 Gly Thr Ile Ala Gly Phe Ser Lys Asp Ala Tyr Asn Val Pro Ile Asn
 25 30 35

cag aaa tcc ctc aag gcg gta aaa gac ctc tcc caa caa gca gac act 259
 Gln Lys Ser Leu Lys Ala Val Lys Asp Leu Ser Gln Gln Ala Asp Thr
 40 45 50

gat gtt gtc att ttg tcg gga cgt cac ctg gag gga ttg aag acg gtt 307
 Asp Val Val Ile Leu Ser Gly Arg His Leu Glu Gly Leu Lys Thr Val
 55 60 65

ctt gat ctt ggt cag tac gac atc acc atg gtc ggt tca cac ggt tct 355
 Leu Asp Leu Gly Gln Tyr Asp Ile Thr Met Val Gly Ser His Gly Ser
 70 75 80 85

gag gat tcc tcc cgc ccg cgt acc ctc act cct gaa gag gta gct cgc 403
 Glu Asp Ser Ser Arg Pro Arg Thr Leu Thr Pro Glu Glu Val Ala Arg
 90 95 100

ctc gcc aag att gaa gca gat ctg gaa aag atc gtc gac ggc atc gaa 451
 Leu Ala Lys Ile Glu Ala Asp Leu Glu Lys Ile Val Asp Gly Ile Glu
 105 110 115

ggc gca ttc gtg gag atc aag cct ttc cac cgc gtg ctg cac ttc atc 499
 Gly Ala Phe Val Glu Ile Lys Pro Phe His Arg Val Leu His Phe Ile
 120 125 130

cgt gtt tcc gac aag gac aaa gtc caa gga atc ctc gcc caa gca gca 547
 Arg Val Ser Asp Lys Asp Lys Val Gln Gly Ile Leu Ala Gln Ala Ala
 135 140 145

cac gta gac tct tcc ggc ctg aag gtt act aac ggc aag agc atc atc 595
 His Val Asp Ser Ser Gly Leu Lys Val Thr Asn Gly Lys Ser Ile Ile
 150 155 160 165

gaa tac tcc atc agc tcc acc acc aag ggc acc tgg ctg aag gaa tac 643
 Glu Tyr Ser Ile Ser Ser Thr Thr Lys Gly Thr Trp Leu Lys Glu Tyr

170

175

180

gtt gac cgc acc gag ccc act ggt gtg att ttc ctc ggc gat gac acc 691
 Val Asp Arg Thr Glu Pro Thr Gly Val Ile Phe Leu Gly Asp Asp Thr
 185 190 195

acc gat gag cac ggt ttc aaa gct tta gaa aac gat gat cgt gcc cta 739
 Thr Asp Glu His Gly Phe Lys Ala Leu Glu Asn Asp Asp Arg Ala Leu
 200 205 210

acc gtc aag gtt ggc gaa gga gac act gca gcc aaa acc cgc gtc gac 787
 Thr Val Lys Val Gly Glu Asp Thr Ala Ala Lys Thr Arg Val Asp
 215 220 225

gat gtt gat aat gtg gga att ttc cta gag aaa ctc gcc tac cac cgc 835
 Asp Val Asp Asn Val Gly Ile Phe Leu Glu Lys Leu Ala Tyr His Arg
 230 235 240 245

atg cag tat gcg gaa agc gtg cga ttg ggg att taagagagcc taaacgcacg 888
 Met Gln Tyr Ala Glu Ser Val Arg Leu Gly Ile
 250 255

aaa 891

<210> 1140

<211> 256

<212> PRT

<213> *Corynebacterium glutamicum*

<400> 1140

Met Thr Leu Thr Ile Glu Glu Ile Ala Lys Thr Lys Lys Leu Leu Val
 1 5 10 15

Val Ser Asp Phe Asp Gly Thr Ile Ala Gly Phe Ser Lys Asp Ala Tyr
 20 25 30

Asn Val Pro Ile Asn Gln Lys Ser Leu Lys Ala Val Lys Asp Leu Ser
 35 40 45

Gln Gln Ala Asp Thr Asp Val Val Ile Leu Ser Gly Arg His Leu Glu
 50 55 60

Gly Leu Lys Thr Val Leu Asp Leu Gly Gln Tyr Asp Ile Thr Met Val
 65 70 75 80

Gly Ser His Gly Ser Glu Asp Ser Ser Arg Pro Arg Thr Leu Thr Pro
 85 90 95

Glu Glu Val Ala Arg Leu Ala Lys Ile Glu Ala Asp Leu Glu Lys Ile
 100 105 110

Val Asp Gly Ile Glu Gly Ala Phe Val Glu Ile Lys Pro Phe His Arg
 115 120 125

Val Leu His Phe Ile Arg Val Ser Asp Lys Asp Lys Val Gln Gly Ile
 130 135 140

Leu Ala Gln Ala Ala His Val Asp Ser Ser Gly Leu Lys Val Thr Asn
 145 150 155 160

Gly Lys Ser Ile Ile Glu Tyr Ser Ile Ser Ser Thr Thr Lys Gly Thr
 165 170 175

Trp Leu Lys Glu Tyr Val Asp Arg Thr Glu Pro Thr Gly Val Ile Phe
 180 185 190

Leu Gly Asp Asp Thr Thr Asp Glu His Gly Phe Lys Ala Leu Glu Asn
 195 200 205

Asp Asp Arg Ala Leu Thr Val Lys Val Gly Glu Gly Asp Thr Ala Ala
 210 215 220

Lys Thr Arg Val Asp Asp Val Asp Asn Val Gly Ile Phe Leu Glu Lys
 225 230 235 240

Leu Ala Tyr His Arg Met Gln Tyr Ala Glu Ser Val Arg Leu Gly Ile
 245 250 255

<210> 1141

<211> 2556

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (101)..(2533)

<223> RXN01239

<400> 1141

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gtacccgcacg atttgccta acttttaagg gtgtttcatc atg gca cgt cca att 115
 Met Ala Arg Pro Ile
 1

tcc gca acg tac agg ctt caa atg cga gga cct caa gca gat agc gcc 163
 Ser Ala Thr Tyr Arg Leu Gln Met Arg Gly Pro Gln Ala Asp Ser Ala
 10 15 20

ggg cgt tca ttt ggt ttt gcg cag gcc aaa gcc cag ctt ccc tat ctg 211
 Gly Arg Ser Phe Gly Phe Ala Gln Ala Lys Ala Gln Leu Pro Tyr Leu
 25 30 35

aag aag cta ggc atc agc cac ctg tac ctc tcc cct att ttt acg gcc 259
 Lys Lys Leu Gly Ile Ser His Leu Tyr Leu Ser Pro Ile Phe Thr Ala
 40 45 50

atg cca gat tcc aat cat ggc tac gat gtc att gat ccc acc acc atc 307
 Met Pro Asp Ser Asn His Gly Tyr Asp Val Ile Asp Pro Thr Thr Ile
 55 60 65

aat gaa gag ctc ggt ggc atg gag ggt ctt cga gat ctt gcc gca gct 355
 Asn Glu Glu Leu Gly Gly Met Glu Gly Leu Arg Asp Leu Ala Ala Ala
 70 75 80 85

aca cac gag ttg ggc atg ggc atc atc att gat att gtt ccc aac cat 403
 Thr His Glu Leu Gly Met Gly Ile Ile Asp Ile Val Pro Asn His

| 90 | 95 | 100 | |
|---|-----|-----|-----|
| tta ggt gtt gcc gtt cca cat ttg aat cct tgg tgg tgg gat gtt cta Leu Gly Val Ala Val Pro His Leu Asn Pro Trp Trp Trp Asp Val Leu 105 | 110 | 115 | 451 |
| aaa aac ggc aaa gat tcc gct ttt gag ttc tat ttc gat att gac tgg Lys Asn Gly Lys Asp Ser Ala Phe Glu Phe Tyr Phe Asp Ile Asp Trp 120 | 125 | 130 | 499 |
| cac gaa gac aac ggt tct ggt ggc aag ctg ggc atg ccg att ctg ggt His Glu Asp Asn Gly Ser Gly Lys Leu Gly Met Pro Ile Leu Gly 135 | 140 | 145 | 547 |
| gct gaa ggc gat gaa gac aag ctg gaa ttc gcg gag ctt gat gga gag Ala Glu Gly Asp Glu Asp Lys Leu Glu Phe Ala Glu Leu Asp Gly Glu 150 | 155 | 160 | 595 |
| aaa gtg ctc aaa tat ttt gac cac ctc ttc cca atc gcg cct ggt acc Lys Val Leu Lys Tyr Phe Asp His Leu Phe Pro Ile Ala Pro Gly Thr 170 | 175 | 180 | 643 |
| gaa gaa ggg aca ccg caa gaa gtc tac aag cgc cag cat tac cgc ctg Glu Glu Gly Thr Pro Gln Glu Val Tyr Lys Arg Gln His Tyr Arg Leu 185 | 190 | 195 | 691 |
| cag ttc tgg cgc gat ggc gtg atc aac ttc cgt cgc ttc ttt tcc gtg Gln Phe Trp Arg Asp Gly Val Ile Asn Phe Arg Arg Phe Phe Ser Val 200 | 205 | 210 | 739 |
| aat acg ttg gct ggc atc agg caa gaa gat ccc tta gtg ttt gaa cat Asn Thr Leu Ala Gly Ile Arg Gln Glu Asp Pro Leu Val Phe Glu His 215 | 220 | 225 | 787 |
| act cat cgt ctg ctg cgc gaa ttg gtg gcg gaa gac ctc att gac ggc Thr His Arg Leu Leu Arg Glu Leu Val Ala Glu Asp Leu Ile Asp Gly 230 | 235 | 240 | 835 |
| gtg cgc gtc gat cac ccc gac ggg ctt tcc gat cct ttt gga tat ctg Val Arg Val Asp His Pro Asp Gly Leu Ser Asp Pro Phe Gly Tyr Leu 250 | 255 | 260 | 883 |
| cac aga ctc cgc gac ctc att gga cct gac cgc tgg ctg atc atc gaa His Arg Leu Arg Asp Leu Ile Gly Pro Asp Arg Trp Leu Ile Ile Glu 265 | 270 | 275 | 931 |
| aag atc ttg agc gtt gat gaa cca ctc gat ccc cgc ctg gcc gtt gat Lys Ile Leu Ser Val Asp Glu Pro Leu Asp Pro Arg Leu Ala Val Asp 280 | 285 | 290 | 979 |
| ggc acc act ggc tac gac gcc ctc cgt gaa ctc gac ggc gtg ttt atc 1027 | | | |
| Gly Thr Thr Gly Tyr Asp Ala Leu Arg Glu Leu Asp Gly Val Phe Ile 295 | 300 | 305 | |
| tcc cga gaa tct gag gac aaa ttc tcc atg ctg gcg ctg acc cac agt 1075 | | | |
| Ser Arg Glu Ser Glu Asp Lys Phe Ser Met Leu Ala Leu Thr His Ser 310 | 315 | 320 | 325 |

gga tcc acc tgg gat gaa cgc gcc ctc aaa tcc acg gag gaa agc ctc
 1123
 Gly Ser Thr Trp Asp Glu Arg Ala Leu Lys Ser Thr Glu Glu Ser Leu
 330 335 340

 aaa cga gtc gtc gcc caa caa gaa ctc gca gcc gaa atc tta agg ctc
 1171
 Lys Arg Val Val Ala Gln Gln Glu Leu Ala Ala Glu Ile Leu Arg Leu
 345 350 355

 gcc cgc gcc atg cgc cgc gat aac ttc tcc acc gca ggc acc aac gtc
 1219
 Ala Arg Ala Met Arg Arg Asp Asn Phe Ser Thr Ala Gly Thr Asn Val
 360 365 370

 acc gaa gac aaa ctt agc gaa acc atc atc gaa tta gtc gcc gcc atg
 1267
 Thr Glu Asp Lys Leu Ser Glu Thr Ile Ile Glu Leu Val Ala Ala Met
 375 380 385

 ccc gtc tac cgc gcc gac tac atc tcc ctc tca cgc acc acc gcc acc
 1315
 Pro Val Tyr Arg Ala Asp Tyr Ile Ser Leu Ser Arg Thr Thr Ala Thr
 390 395 400 405

 gtc atc gcg gag atg tcc aaa cgc ttc ccc tcc cgg cgt gac gca ctc
 1363
 Val Ile Ala Glu Met Ser Lys Arg Phe Pro Ser Arg Arg Asp Ala Leu
 410 415 420

 gac ctc atc gcg gcc gcc cta ctt ggc aat ggc gag gcc aaa atc cgc
 1411
 Asp Leu Ile Ala Ala Ala Leu Leu Gly Asn Gly Glu Ala Lys Ile Arg
 425 430 435

 ttc gct caa gtc tgc ggc gcc gtc atg gct aaa ggt gtg gaa gac acc
 1459
 Phe Ala Gln Val Cys Gly Ala Val Met Ala Lys Gly Val Glu Asp Thr
 440 445 450

 acc ttc tac cgc gca tct agg ctc gtt gca ttg caa gaa gtc ggt ggc
 1507
 Thr Phe Tyr Arg Ala Ser Arg Leu Val Ala Leu Gln Glu Val Gly Gly
 455 460 465

 gcg ccg ggg aga ttc ggc gtc tcc gct gca gaa ttc cac ttg ctg cag
 1555
 Ala Pro Gly Arg Phe Gly Val Ser Ala Ala Glu Phe His Leu Leu Gln
 470 475 480 485

 gaa gaa cgc agc ctg ctg tgg cca cgc acc atg acc acc ttg tcc acg
 1603
 Glu Glu Arg Ser Leu Leu Trp Pro Arg Thr Met Thr Thr Leu Ser Thr
 490 495 500

 cat gac acc aaa cgt ggc gaa gat acc cgc gcc cgc atc atc tcc ctg
 1651
 His Asp Thr Lys Arg Gly Glu Asp Thr Arg Ala Arg Ile Ile Ser Leu
 505 510 515

tct gaa gtc ccc gat atg tac tcc gag ctg gtc aat cgt gtt ttc gcg
 1699
 Ser Glu Val Pro Asp Met Tyr Ser Glu Leu Val Asn Arg Val Phe Ala
 520 525 530

 gtg ctc ccc gcg cca gac ggc gca acg ggc agt ttc ctc cta caa aac
 1747
 Val Leu Pro Ala Pro Asp Gly Ala Thr Gly Ser Phe Leu Leu Gln Asn
 535 540 545

 ctg ctg ggc gta tgg ccc gcc gac ggc gtg atc acc gat gcg ctg cgc
 1795
 Leu Leu Gly Val Trp Pro Ala Asp Gly Val Ile Thr Asp Ala Leu Arg
 550 555 560 565

 gat cga ttc agg gaa tac gcc cta aaa gct atc cgc gaa gca tcc aca
 1843
 Asp Arg Phe Arg Glu Tyr Ala Leu Lys Ala Ile Arg Glu Ala Ser Thr
 570 575 580

 aaa acc acg tgg gtg gac ccc aac gag tcc ttc gag gct gcg gtc tgc
 1891
 Lys Thr Thr Trp Val Asp Pro Asn Glu Ser Phe Glu Ala Ala Val Cys
 585 590 595

 gat tgg gtg gaa gcg ctt ttc gac gga ccc tcc acc tca cta atc acc
 1939
 Asp Trp Val Glu Ala Leu Phe Asp Gly Pro Ser Thr Ser Leu Ile Thr
 600 605 610

 gaa ttt gtc tcc cac atc aac cgt ggc tct gtg caa atc tcc tta ggc
 1987
 Glu Phe Val Ser His Ile Asn Arg Gly Ser Val Gln Ile Ser Leu Gly
 615 620 625

 agg aaa ctg ctg caa atg gtg ggc gct gga atc ccc gac act tac caa
 2035
 Arg Lys Leu Leu Gln Met Val Gly Ala Gly Ile Pro Asp Thr Tyr Gln
 630 635 640 645

 gga act gag ttt tta gaa gac tcc ctg gta gat ccc gat aac cga cgc
 2083
 Gly Thr Glu Phe Leu Glu Asp Ser Leu Val Asp Pro Asp Asn Arg Arg
 650 655 660

 ttt gtt gat tac acc gcc aga gaa caa gtc ctg gag cgc ctg caa acc
 2131
 Phe Val Asp Tyr Thr Ala Arg Glu Gln Val Leu Glu Arg Leu Gln Thr
 665 670 675

 tgg gct tgg acg cag gtt aat tcg gta gaa gac ttg gtg gat aac gcc
 2179
 Trp Ala Trp Thr Gln Val Asn Ser Val Glu Asp Leu Val Asp Asn Ala
 680 685 690

 gac atc gcc aaa atg gcc gtg gtc cat aaa tcc ctc gag ttg cgt gct
 2227
 Asp Ile Ala Lys Met Ala Val Val His Lys Ser Leu Glu Leu Arg Ala
 695 700 705

gaa ttt cgt gca agc ttt gtt ggt gga gat cat cag gca gta ttt ggc
2275

Glu Phe Arg Ala Ser Phe Val Gly Gly Asp His Gln Ala Val Phe Gly
710 715 720 725

gaa ggt cgc gca gaa tcc cac atc atg ggc atc gcc cgc ggt aca gac
2323

Glu Gly Arg Ala Glu Ser His Ile Met Gly Ile Ala Arg Gly Thr Asp
730 735 740

cga aac cac ctc aac atc att gct ctt gct acc cgt cga cca ctg atc
2371

Arg Asn His Leu Asn Ile Ile Ala Leu Ala Thr Arg Arg Pro Leu Ile
745 750 755

ttg gaa gac cgt ggc gga tgg tat gac acc acc gtc acg ctt cct ggt
2419

Leu Glu Asp Arg Gly Gly Trp Tyr Asp Thr Thr Val Thr Leu Pro Gly
760 765 770

gga caa tgg gaa gac agg ctc acc ggg caa cgc ttc agt ggt gtt gtc
2467

Gly Gln Trp Glu Asp Arg Leu Thr Gly Gln Arg Phe Ser Gly Val Val
775 780 785

cca gcc acc gat ttg ttc tca cat cta ccc gta tct ttg ttg gtt tta
2515

Pro Ala Thr Asp Leu Phe Ser His Leu Pro Val Ser Leu Leu Val Leu
790 795 800 805

gta ccc gat agt gag ttt tgatccctgc acaggaaagt tag

2556

Val Pro Asp Ser Glu Phe
810

<210> 1142

<211> 811

<212> PRT

<213> Corynebacterium glutamicum

<400> 1142

Met Ala Arg Pro Ile Ser Ala Thr Tyr Arg Leu Gln Met Arg Gly Pro
1 5 10 15

Gln Ala Asp Ser Ala Gly Arg Ser Phe Gly Phe Ala Gln Ala Lys Ala
20 25 30

Gln Leu Pro Tyr Leu Lys Leu Gly Ile Ser His Leu Tyr Leu Ser
35 40 45

Pro Ile Phe Thr Ala Met Pro Asp Ser Asn His Gly Tyr Asp Val Ile
50 55 60

Asp Pro Thr Thr Ile Asn Glu Glu Leu Gly Gly Met Glu Gly Leu Arg
65 70 75 80

Asp Leu Ala Ala Ala Thr His Glu Leu Gly Met Gly Ile Ile Asp
85 90 95

Ile Val Pro Asn His Leu Gly Val Ala Val Pro His Leu Asn Pro Trp

| 100 | 105 | 110 |
|---|-----|-----|
| Trp Trp Asp Val Leu Lys Asn Gly Lys Asp Ser Ala Phe Glu Phe Tyr | | |
| 115 | 120 | 125 |
| Phe Asp Ile Asp Trp His Glu Asp Asn Gly Ser Gly Gly Lys Leu Gly | | |
| 130 | 135 | 140 |
| Met Pro Ile Leu Gly Ala Glu Gly Asp Glu Asp Lys Leu Glu Phe Ala | | |
| 145 | 150 | 155 |
| Glu Leu Asp Gly Glu Lys Val Leu Lys Tyr Phe Asp His Leu Phe Pro | | |
| 165 | 170 | 175 |
| Ile Ala Pro Gly Thr Glu Glu Gly Thr Pro Gln Glu Val Tyr Lys Arg | | |
| 180 | 185 | 190 |
| Gln His Tyr Arg Leu Gln Phe Trp Arg Asp Gly Val Ile Asn Phe Arg | | |
| 195 | 200 | 205 |
| Arg Phe Phe Ser Val Asn Thr Leu Ala Gly Ile Arg Gln Glu Asp Pro | | |
| 210 | 215 | 220 |
| Leu Val Phe Glu His Thr His Arg Leu Leu Arg Glu Leu Val Ala Glu | | |
| 225 | 230 | 235 |
| Asp Leu Ile Asp Gly Val Arg Val Asp His Pro Asp Gly Leu Ser Asp | | |
| 245 | 250 | 255 |
| Pro Phe Gly Tyr Leu His Arg Leu Arg Asp Leu Ile Gly Pro Asp Arg | | |
| 260 | 265 | 270 |
| Trp Leu Ile Ile Glu Lys Ile Leu Ser Val Asp Glu Pro Leu Asp Pro | | |
| 275 | 280 | 285 |
| Arg Leu Ala Val Asp Gly Thr Thr Gly Tyr Asp Ala Leu Arg Glu Leu | | |
| 290 | 295 | 300 |
| Asp Gly Val Phe Ile Ser Arg Glu Ser Glu Asp Lys Phe Ser Met Leu | | |
| 305 | 310 | 315 |
| 320 | | |
| Ala Leu Thr His Ser Gly Ser Thr Trp Asp Glu Arg Ala Leu Lys Ser | | |
| 325 | 330 | 335 |
| Thr Glu Glu Ser Leu Lys Arg Val Val Ala Gln Gln Glu Leu Ala Ala | | |
| 340 | 345 | 350 |
| Glu Ile Leu Arg Leu Ala Arg Ala Met Arg Arg Asp Asn Phe Ser Thr | | |
| 355 | 360 | 365 |
| Ala Gly Thr Asn Val Thr Glu Asp Lys Leu Ser Glu Thr Ile Ile Glu | | |
| 370 | 375 | 380 |
| Leu Val Ala Ala Met Pro Val Tyr Arg Ala Asp Tyr Ile Ser Leu Ser | | |
| 385 | 390 | 395 |
| 400 | | |
| Arg Thr Thr Ala Thr Val Ile Ala Glu Met Ser Lys Arg Phe Pro Ser | | |
| 405 | 410 | 415 |
| Arg Arg Asp Ala Leu Asp Leu Ile Ala Ala Ala Leu Leu Gly Asn Gly | | |
| 420 | 425 | 430 |

Glu Ala Lys Ile Arg Phe Ala Gln Val Cys Gly Ala Val Met Ala Lys
435 440 445

Gly Val Glu Asp Thr Thr Phe Tyr Arg Ala Ser Arg Leu Val Ala Leu
450 455 460

Gln Glu Val Gly Gly Ala Pro Gly Arg Phe Gly Val Ser Ala Ala Glu
465 470 475 480

Phe His Leu Leu Gln Glu Arg Ser Leu Leu Trp Pro Arg Thr Met
485 490 495

Thr Thr Leu Ser Thr His Asp Thr Lys Arg Gly Glu Asp Thr Arg Ala
500 505 510

Arg Ile Ile Ser Leu Ser Glu Val Pro Asp Met Tyr Ser Glu Leu Val
515 520 525

Asn Arg Val Phe Ala Val Leu Pro Ala Pro Asp Gly Ala Thr Gly Ser
530 535 540

Phe Leu Leu Gln Asn Leu Leu Gly Val Trp Pro Ala Asp Gly Val Ile
545 550 555 560

Thr Asp Ala Leu Arg Asp Arg Phe Arg Glu Tyr Ala Leu Lys Ala Ile
565 570 575

Arg Glu Ala Ser Thr Lys Thr Thr Trp Val Asp Pro Asn Glu Ser Phe
580 585 590

Glu Ala Ala Val Cys Asp Trp Val Glu Ala Leu Phe Asp Gly Pro Ser
595 600 605

Thr Ser Leu Ile Thr Glu Phe Val Ser His Ile Asn Arg Gly Ser Val
610 615 620

Gln Ile Ser Leu Gly Arg Lys Leu Leu Gln Met Val Gly Ala Gly Ile
625 630 635 640

Pro Asp Thr Tyr Gln Gly Thr Glu Phe Leu Glu Asp Ser Leu Val Asp
645 650 655

Pro Asp Asn Arg Arg Phe Val Asp Tyr Thr Ala Arg Glu Gln Val Leu
660 665 670

Glu Arg Leu Gln Thr Trp Ala Trp Thr Gln Val Asn Ser Val Glu Asp
675 680 685

Leu Val Asp Asn Ala Asp Ile Ala Lys Met Ala Val Val His Lys Ser
690 695 700

Leu Glu Leu Arg Ala Glu Phe Arg Ala Ser Phe Val Gly Gly Asp His
705 710 715 720

Gln Ala Val Phe Gly Glu Gly Arg Ala Glu Ser His Ile Met Gly Ile
725 730 735

Ala Arg Gly Thr Asp Arg Asn His Leu Asn Ile Ile Ala Leu Ala Thr
740 745 750

Arg Arg Pro Leu Ile Leu Glu Asp Arg Gly Gly Trp Tyr Asp Thr Thr
 755 760 765

Val Thr Leu Pro Gly Gly Gln Trp Glu Asp Arg Leu Thr Gly Gln Arg
 770 775 780

Phe Ser Gly Val Val Pro Ala Thr Asp Leu Phe Ser His Leu Pro Val
 785 790 795 800

Ser Leu Leu Val Leu Val Pro Asp Ser Glu Phe
 805 810

<210> 1143

<211> 2556

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (101)..(2533)

<223> FRXA01239

<400> 1143

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gtaccgcacg atttgccta acttttaagg gtgtttcatc atg gca cgt cca att 115
 Met Ala Arg Pro Ile
 1 5

tcc gca acg tac agg ctt caa atg cga gga cct caa gca gat agc gcc 163
 Ser Ala Thr Tyr Arg Leu Gln Met Arg Gly Pro Gln Ala Asp Ser Ala
 10 15 20

ggg cgt tca ttt ggt ttt gcg cag gcc aaa gcc cag ctt ccc tat ctg 211
 Gly Arg Ser Phe Gly Phe Ala Gln Ala Lys Ala Gln Leu Pro Tyr Leu
 25 30 35

aag aag cta ggc atc agc cac ctg tac ctc tcc cct att ttt acg gcc 259
 Lys Lys Leu Gly Ile Ser His Leu Tyr Leu Ser Pro Ile Phe Thr Ala
 40 45 50

atg cca gat tcc aat cat ggc tac gat gtc att gat ccc acc acc atc 307
 Met Pro Asp Ser Asn His Gly Tyr Asp Val Ile Asp Pro Thr Thr Ile
 55 60 65

aat gaa gag ctc ggt ggc atg gag ggt ctt cga gat ctt gcc gca gct 355
 Asn Glu Glu Leu Gly Gly Met Glu Gly Leu Arg Asp Leu Ala Ala Ala
 70 75 80 85

aca cac gag ttg ggc atg ggc atc atc att gat att gtt ccc aac cat 403
 Thr His Glu Leu Gly Met Gly Ile Ile Ile Asp Ile Val Pro Asn His
 90 95 100

tta ggt gtt gcc gtt cca cat ttg aat cct tgg tgg tgg gat gtt cta 451
 Leu Gly Val Ala Val Pro His Leu Asn Pro Trp Trp Trp Asp Val Leu
 105 110 115

aaa aac ggc aaa gat tcc gct ttt gag ttc tat ttc gat att gac tgg 499
 Lys Asn Gly Lys Asp Ser Ala Phe Glu Phe Tyr Phe Asp Ile Asp Trp
 120 125 130

| | |
|---|-----|
| cac gaa gac aac ggt tct ggt ggc aag ctg ggc atg ccg att ctg ggt | 547 |
| His Glu Asp Asn Gly Ser Gly Gly Lys Leu Gly Met Pro Ile Leu Gly | |
| 135 140 145 | |
| gct gaa ggc gat gaa gac aag ctg gaa ttc gcg gag ctt gat gga gag | 595 |
| Ala Glu Gly Asp Glu Asp Lys Leu Glu Phe Ala Glu Leu Asp Gly Glu | |
| 150 155 160 165 | |
| aaa gtg ctc aaa tat ttt gac cac ctc ttc cca atc gcg cct ggt acc | 643 |
| Lys Val Leu Lys Tyr Phe Asp His Leu Phe Pro Ile Ala Pro Gly Thr | |
| 170 175 180 | |
| gaa gaa ggg aca ccg caa gaa gtc tac aag cgc cag cat tac cgc ctg | 691 |
| Glu Glu Gly Thr Pro Gln Glu Val Tyr Lys Arg Gln His Tyr Arg Leu | |
| 185 190 195 | |
| cag ttc tgg cgc gat ggc gtg atc aac ttc cgt cgc ttc ttt tcc gtg | 739 |
| Gln Phe Trp Arg Asp Gly Val Ile Asn Phe Arg Arg Phe Phe Ser Val | |
| 200 205 210 | |
| aat acg ttg gct ggc atc agg caa gaa gat ccc tta gtg ttt gaa cat | 787 |
| Asn Thr Leu Ala Gly Ile Arg Gln Glu Asp Pro Leu Val Phe Glu His | |
| 215 220 225 | |
| act cat cgt ctg ctg cgc gaa ttg gtg gcg gaa gac ctc att gac ggc | 835 |
| Thr His Arg Leu Leu Arg Glu Leu Val Ala Glu Asp Leu Ile Asp Gly | |
| 230 235 240 245 | |
| gtg cgc gtc gat cac ccc gac ggg ctt tcc gat cct ttt gga tat ctg | 883 |
| Val Arg Val Asp His Pro Asp Gly Leu Ser Asp Pro Phe Gly Tyr Leu | |
| 250 255 260 | |
| cac aga ctc cgc gac ctc att gga cct gac cgc tgg ctg atc atc gaa | 931 |
| His Arg Leu Arg Asp Leu Ile Gly Pro Asp Arg Trp Leu Ile Ile Glu | |
| 265 270 275 | |
| aag atc ttg agc gtt gat gaa cca ctc gat ccc cgc ctg gcc gtt gat | 979 |
| Lys Ile Leu Ser Val Asp Glu Pro Leu Asp Pro Arg Leu Ala Val Asp | |
| 280 285 290 | |
| ggc acc act ggc tac gac gcc ctc cgt gaa ctc gac ggc gtg ttt atc | |
| 1027 | |
| Gly Thr Thr Gly Tyr Asp Ala Leu Arg Glu Leu Asp Gly Val Phe Ile | |
| 295 300 305 | |
| tcc cga gaa tct gag gac aaa ttc tcc atg ctg gcg ctg acc cac agt | |
| 1075 | |
| Ser Arg Glu Ser Glu Asp Lys Phe Ser Met Leu Ala Leu Thr His Ser | |
| 310 315 320 325 | |
| gga tcc acc tgg gat gaa cgc gcc ctc aaa tcc acg gag gaa agc ctc | |
| 1123 | |
| Gly Ser Thr Trp Asp Glu Arg Ala Leu Lys Ser Thr Glu Glu Ser Leu | |
| 330 335 340 | |
| aaa cga gtc gtc gcc caa caa gaa ctc gca gcc gaa atc tta agg ctc | |
| 1171 | |
| Lys Arg Val Val Ala Gln Gln Glu Leu Ala Ala Glu Ile Leu Arg Leu | |
| 345 350 355 | |

gcc cgc gcc atg cgc cgc gat aac ttc tcc acc gca ggc acc aac gtc
 1219
 Ala Arg Ala Met Arg Arg Asp Asn Phe Ser Thr Ala Gly Thr Asn Val
 360 365 370

 acc gaa gac aaa ctt agc gaa acc atc atc gaa tta gtc gcc gcc atg
 1267
 Thr Glu Asp Lys Leu Ser Glu Thr Ile Ile Glu Leu Val Ala Ala Met
 375 380 385

 ccc gtc tac cgc gcc gac tac atc tcc ctc tca cgc acc acc gcc acc
 1315
 Pro Val Tyr Arg Ala Asp Tyr Ile Ser Leu Ser Arg Thr Thr Ala Thr
 390 395 400 405

 gtc atc gcg gag atg tcc aaa cgc ttc ccc tcc cgg cgt gac gca ctc
 1363
 Val Ile Ala Glu Met Ser Lys Arg Phe Pro Ser Arg Arg Asp Ala Leu
 410 415 420

 gac ctc atc gcg gcc ccc cta ctt ggc aat ggc gag gcc aaa atc cgc
 1411
 Asp Leu Ile Ala Ala Leu Leu Gly Asn Gly Glu Ala Lys Ile Arg
 425 430 435

 ttc gct caa gtc tgc ggc gcc gtc atg gct aaa ggt gtg gaa gac acc
 1459
 Phe Ala Gln Val Cys Gly Ala Val Met Ala Lys Gly Val Glu Asp Thr
 440 445 450

 acc ttc tac cgc gca tct agg ctc gtt gca ttg caa gaa gtc ggt ggc
 1507
 Thr Phe Tyr Arg Ala Ser Arg Leu Val Ala Leu Gln Glu Val Gly Gly
 455 460 465

 gcg ccg ggg aga ttc ggc gtc tcc gct gca gaa ttc cac ttg ctg cag
 1555
 Ala Pro Gly Arg Phe Gly Val Ser Ala Ala Glu Phe His Leu Leu Gln
 470 475 480 485

 gaa gaa cgc agc ctg ctg tgg cca cgc acc atg acc acc ttg tcc acg
 1603
 Glu Glu Arg Ser Leu Leu Trp Pro Arg Thr Met Thr Leu Ser Thr
 490 495 500

 cat gac acc aaa cgt ggc gaa gat acc cgc gcc cgc atc atc tcc ctg
 1651
 His Asp Thr Lys Arg Gly Glu Asp Thr Arg Ala Arg Ile Ile Ser Leu
 505 510 515

 tct gaa gtc ccc gat atg tac tcc gag ctg gtc aat cgt gtt ttc gcg
 1699
 Ser Glu Val Pro Asp Met Tyr Ser Glu Leu Val Asn Arg Val Phe Ala
 520 525 530

 gtg ctc ccc gcg cca gac ggc gca acg ggc agt ttc ctc cta caa aac
 1747
 Val Leu Pro Ala Pro Asp Gly Ala Thr Gly Ser Phe Leu Leu Gln Asn
 535 540 545

ctg ctg ggc gta tgg ccc gcc gac ggc gtg atc acc gat gcg ctg cgc
 1795
 Leu Leu Gly Val Trp Pro Ala Asp Gly Val Ile Thr Asp Ala Leu Arg
 550 555 560 565

 gat cga ttc agg gaa tac gcc cta aaa gct atc cgc gaa gca tcc aca
 1843
 Asp Arg Phe Arg Glu Tyr Ala Leu Lys Ala Ile Arg Glu Ala Ser Thr
 570 575 580

 aaa acc acg tgg gtg gac ccc aac gag tcc ttc gag gct gcg gtc tgc
 1891
 Lys Thr Thr Trp Val Asp Pro Asn Glu Ser Phe Glu Ala Ala Val Cys
 585 590 595

 gat tgg gtg gaa gcg ctt ttc gac gga ccc tcc acc tca cta atc acc
 1939
 Asp Trp Val Glu Ala Leu Phe Asp Gly Pro Ser Thr Ser Leu Ile Thr
 600 605 610

 gaa ttt gtc tcc cac atc aac cgt ggc tct gtg caa atc tcc tta ggc
 1987
 Glu Phe Val Ser His Ile Asn Arg Gly Ser Val Gln Ile Ser Leu Gly
 615 620 625

 agg aaa ctg ctg caa atg gtg ggc gct gga atc ccc gac act tac caa
 2035
 Arg Lys Leu Leu Gln Met Val Gly Ala Gly Ile Pro Asp Thr Tyr Gln
 630 635 640 645

 gga act gag ttt tta gaa gac tcc ctg gta gat ccc gat aac cga cgc
 2083
 Gly Thr Glu Phe Leu Glu Asp Ser Leu Val Asp Pro Asp Asn Arg Arg
 650 655 660

 ttt gtt gat tac acc gcc aga gaa caa gtc ctg gag cgc ctg caa acc
 2131
 Phe Val Asp Tyr Thr Ala Arg Glu Gln Val Leu Glu Arg Leu Gln Thr
 665 670 675

 tgg gat tgg acg cag gtt aat tcg gta gaa gac ttg gtg gat aac gcc
 2179
 Trp Asp Trp Thr Gln Val Asn Ser Val Glu Asp Leu Val Asp Asn Ala
 680 685 690

 gac atc gcc aaa atg gcc gtg gtc cat aaa tcc ctc gag ttg cgt gct
 2227
 Asp Ile Ala Lys Met Ala Val Val His Lys Ser Leu Glu Leu Arg Ala
 695 700 705

 gaa ttt cgt gca agc ttt gtt ggt gga gat cat cag gca gta ttt ggc
 2275
 Glu Phe Arg Ala Ser Phe Val Gly Gly Asp His Gln Ala Val Phe Gly
 710 715 720 725

 gaa ggt cgc gca gaa tcc cac atc atg ggc atc gcc cgc ggt aca gac
 2323
 Glu Gly Arg Ala Glu Ser His Ile Met Gly Ile Ala Arg Gly Thr Asp
 730 735 740

cga aac cac ctc aac atc att gct ctt gct acc cgt cga cca ctg atc
2371

Arg Asn His Leu Asn Ile Ile Ala Leu Ala Thr Arg Arg Pro Leu Ile
745 750 755

ttg gaa gac cgt ggc gga tgg tat gac acc acc gtc acg ctt cct ggt
2419

Leu Glu Asp Arg Gly Gly Trp Tyr Asp Thr Thr Val Thr Leu Pro Gly
760 765 770

gga caa tgg gaa gac agg ctc acc ggg caa cgc ttc agt ggt gtt gtc
2467

Gly Gln Trp Glu Asp Arg Leu Thr Gly Gln Arg Phe Ser Gly Val Val
775 780 785

cca gcc acc gat ttg ttc tca cat cta ccc gta tct ttg ttg gtt tta
2515

Pro Ala Thr Asp Leu Phe Ser His Leu Pro Val Ser Leu Leu Val Leu
790 795 800 805

gta ccc gat agt gag ttt tgatccctgc acaggaaagt tag
2556

Val Pro Asp Ser Glu Phe
810

<210> 1144

<211> 811

<212> PRT

<213> *Corynebacterium glutamicum*

<400> 1144

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20 25 30

Gln Leu Pro Tyr Leu Lys Lys Leu Gly Ile Ser His Leu Tyr Leu Ser
35 40 45

Pro Ile Phe Thr Ala Met Pro Asp Ser Asn His Gly Tyr Asp Val Ile
50 55 60

Asp Pro Thr Thr Ile Asn Glu Glu Leu Gly Gly Met Glu Gly Leu Arg
65 70 75 80

Asp Leu Ala Ala Ala Thr His Glu Leu Gly Met Gly Ile Ile Ile Asp
85 90 95

Ile Val Pro Asn His Leu Gly Val Ala Val Pro His Leu Asn Pro Trp
100 105 110

Trp Trp Asp Val Leu Lys Asn Gly Lys Asp Ser Ala Phe Glu Phe Tyr
115 120 125

Phe Asp Ile Asp Trp His Glu Asp Asn Gly Ser Gly Gly Lys Leu Gly
130 135 140

Met Pro Ile Leu Gly Ala Glu Gly Asp Glu Asp Lys Leu Glu Phe Ala
145 150 155 160

Glu Leu Asp Gly Glu Lys Val Leu Lys Tyr Phe Asp His Leu Phe Pro
 165 170 175
 Ile Ala Pro Gly Thr Glu Glu Gly Thr Pro Gln Glu Val Tyr Lys Arg
 180 185 190
 Gln His Tyr Arg Leu Gln Phe Trp Arg Asp Gly Val Ile Asn Phe Arg
 195 200 205
 Arg Phe Phe Ser Val Asn Thr Leu Ala Gly Ile Arg Gln Glu Asp Pro
 210 215 220
 Leu Val Phe Glu His Thr His Arg Leu Leu Arg Glu Leu Val Ala Glu
 225 230 235 240
 Asp Leu Ile Asp Gly Val Arg Val Asp His Pro Asp Gly Leu Ser Asp
 245 250 255
 Pro Phe Gly Tyr Leu His Arg Leu Arg Asp Leu Ile Gly Pro Asp Arg
 260 265 270
 Trp Leu Ile Ile Glu Lys Ile Leu Ser Val Asp Glu Pro Leu Asp Pro
 275 280 285
 Arg Leu Ala Val Asp Gly Thr Thr Gly Tyr Asp Ala Leu Arg Glu Leu
 290 295 300
 Asp Gly Val Phe Ile Ser Arg Glu Ser Glu Asp Lys Phe Ser Met Leu
 305 310 315 320
 Ala Leu Thr His Ser Gly Ser Thr Trp Asp Glu Arg Ala Leu Lys Ser
 325 330 335
 Thr Glu Glu Ser Leu Lys Arg Val Val Ala Gln Gln Glu Leu Ala Ala
 340 345 350
 Glu Ile Leu Arg Leu Ala Arg Ala Met Arg Arg Asp Asn Phe Ser Thr
 355 360 365
 Ala Gly Thr Asn Val Thr Glu Asp Lys Leu Ser Glu Thr Ile Ile Glu
 370 375 380
 Leu Val Ala Ala Met Pro Val Tyr Arg Ala Asp Tyr Ile Ser Leu Ser
 385 390 395 400
 Arg Thr Thr Ala Thr Val Ile Ala Glu Met Ser Lys Arg Phe Pro Ser
 405 410 415
 Arg Arg Asp Ala Leu Asp Leu Ile Ala Ala Leu Leu Gly Asn Gly
 420 425 430
 Glu Ala Lys Ile Arg Phe Ala Gln Val Cys Gly Ala Val Met Ala Lys
 435 440 445
 Gly Val Glu Asp Thr Thr Phe Tyr Arg Ala Ser Arg Leu Val Ala Leu
 450 455 460
 Gln Glu Val Gly Gly Ala Pro Gly Arg Phe Gly Val Ser Ala Ala Glu
 465 470 475 480

Phe His Leu Leu Gln Glu Glu Arg Ser Leu Leu Trp Pro Arg Thr Met
 485 490 495
 Thr Thr Leu Ser Thr His Asp Thr Lys Arg Gly Glu Asp Thr Arg Ala
 500 505 510
 Arg Ile Ile Ser Leu Ser Glu Val Pro Asp Met Tyr Ser Glu Leu Val
 515 520 525
 Asn Arg Val Phe Ala Val Leu Pro Ala Pro Asp Gly Ala Thr Gly Ser
 530 535 540
 Phe Leu Leu Gln Asn Leu Leu Gly Val Trp Pro Ala Asp Gly Val Ile
 545 550 555 560
 Thr Asp Ala Leu Arg Asp Arg Phe Arg Glu Tyr Ala Leu Lys Ala Ile
 565 570 575
 Arg Glu Ala Ser Thr Lys Thr Thr Trp Val Asp Pro Asn Glu Ser Phe
 580 585 590
 Glu Ala Ala Val Cys Asp Trp Val Glu Ala Leu Phe Asp Gly Pro Ser
 595 600 605
 Thr Ser Leu Ile Thr Glu Phe Val Ser His Ile Asn Arg Gly Ser Val
 610 615 620
 Gln Ile Ser Leu Gly Arg Lys Leu Leu Gln Met Val Gly Ala Gly Ile
 625 630 635 640
 Pro Asp Thr Tyr Gln Gly Thr Glu Phe Leu Glu Asp Ser Leu Val Asp
 645 650 655
 Pro Asp Asn Arg Arg Phe Val Asp Tyr Thr Ala Arg Glu Gln Val Leu
 660 665 670
 Glu Arg Leu Gln Thr Trp Asp Trp Thr Gln Val Asn Ser Val Glu Asp
 675 680 685
 Leu Val Asp Asn Ala Asp Ile Ala Lys Met Ala Val Val His Lys Ser
 690 695 700
 Leu Glu Leu Arg Ala Glu Phe Arg Ala Ser Phe Val Gly Gly Asp His
 705 710 715 720
 Gln Ala Val Phe Gly Glu Gly Arg Ala Glu Ser His Ile Met Gly Ile
 725 730 735
 Ala Arg Gly Thr Asp Arg Asn His Leu Asn Ile Ile Ala Leu Ala Thr
 740 745 750
 Arg Arg Pro Leu Ile Leu Glu Asp Arg Gly Gly Trp Tyr Asp Thr Thr
 755 760 765
 Val Thr Leu Pro Gly Gly Gln Trp Glu Asp Arg Leu Thr Gly Gln Arg
 770 775 780
 Phe Ser Gly Val Val Pro Ala Thr Asp Leu Phe Ser His Leu Pro Val
 785 790 795 800
 Ser Leu Leu Val Leu Val Pro Asp Ser Glu Phe

805

810

<210> 1145

<211> 1953

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(1930)

<223> RXA02645

<400> 1145

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tgatataaggc cagaaatcg gacgcgttga tctcttagttc atg ctc aaa gac ttg 115
Met Leu Lys Asp Leu
1 5acc ggc ctg agg gag ttg gta ttg cgt gag atg tgc cat agc atc tca 163
Thr Gly Leu Arg Glu Leu Val Leu Arg Glu Met Cys His Ser Ile Ser
10 15 20cat ctt agc tcg cca acc ggc agc att ttc act agc ctg gtg gcc atg 211
His Leu Ser Ser Pro Thr Gly Ser Ile Phe Thr Ser Leu Val Ala Met
25 30 35ttg acc tcg caa agc ttt tca gtg tgg gct cca ctt ccc cac gat gta 259
Leu Thr Ser Gln Ser Phe Ser Val Trp Ala Pro Leu Pro His Asp Val
40 45 50cat ctg atc ctc aac ggc gaa acc ctc ccc atg cac aaa acg gag ggc 307
His Leu Ile Leu Asn Gly Glu Thr Leu Pro Met His Lys Thr Glu Gly
55 60 65agc tgg tgg cgc gcc gag atc gcg ccc aag gcc ggc gat cgt tac ggt 355
Ser Trp Trp Arg Ala Glu Ile Ala Pro Lys Ala Gly Asp Arg Tyr Gly
70 75 80 85ttt tcg ctt ttc gac ggc tcc tcc tgg tca aaa acc ctc ccc gat ccc 403
Phe Ser Leu Phe Asp Gly Ser Ser Trp Ser Lys Thr Leu Pro Asp Pro
90 95 100cgc tcc aca tct caa cca gac ggg gtt cat ggt tta agt gaa gtc tcc 451
Arg Ser Thr Ser Gln Pro Asp Gly Val His Gly Leu Ser Glu Val Ser
105 110 115gat gat tcc tat ctg tgg ggt gac cag cag tgg act ggc cga att ctc 499
Asp Asp Ser Tyr Leu Trp Gly Asp Gln Gln Trp Thr Gly Arg Ile Leu
120 125 130cct ggc tcg gtg tta tat gag ctg cat gtg ggc acc ttt agt gaa gat 547
Pro Gly Ser Val Leu Tyr Glu Leu His Val Gly Thr Phe Ser Glu Asp
135 140 145gga acg ttt gag gga gtc gtc gac aag ctt cct tat ctg cgc gac ctc 595
Gly Thr Phe Glu Gly Val Val Asp Lys Leu Pro Tyr Leu Arg Asp Leu
150 155 160 165

ggc gtg acc gcc atc gaa ctt tta ccc gtg cag ccc ttt ggc ggc aac 643

Gly Val Thr Ala Ile Glu Leu Leu Pro Val Gln Pro Phe Gly Gly Asn
 170 175 180
 cgc aat tgg ggc tac gac ggg gtg ctg tgg cac gcc gtc cat gca ggc 691
 Arg Asn Trp Gly Tyr Asp Gly Val Leu Trp His Ala Val His Ala Gly
 185 190 195
 tac ggc ggt ccg gcg ggc ttg aaa aag ctt atc gac gcc tcc cac cag 739
 Tyr Gly Gly Pro Ala Gly Leu Lys Lys Leu Ile Asp Ala Ser His Gln
 200 205 210
 gcc ggc atc gcc gtc tac tta gac gtc gtg tac aac cac ttc ggc ccc 787
 Ala Gly Ile Ala Val Tyr Leu Asp Val Val Tyr Asn His Phe Gly Pro
 215 220 225
 gac ggc aac tac aac ggg caa ttt ggc ccc tac acc tct ggc ggc agc 835
 Asp Gly Asn Tyr Asn Gly Gln Phe Gly Pro Tyr Thr Ser Gly Gly Ser
 230 235 240 245
 acc ggc tgg ggc gac gtg gtc aac atc aac ggc cat gat tca gat gaa 883
 Thr Gly Trp Gly Asp Val Val Asn Ile Asn Gly His Asp Ser Asp Glu
 250 255 260
 gtc cgc aat tat att ctc gac gcc gca cgc cag tgg ttc gaa gat ttt 931
 Val Arg Asn Tyr Ile Leu Asp Ala Ala Arg Gln Trp Phe Glu Asp Phe
 265 270 275
 cac gtt gat ggg ctc cgc ctc gat gcg gtg cat tct ctc gat gat cgc 979
 His Val Asp Gly Leu Arg Leu Asp Ala Val His Ser Leu Asp Asp Arg
 280 285 290
 ggc gcc tat tcc cta ctt gcg cag ctg acc atg gtg gcc gag gat gtc
 1027
 Gly Ala Tyr Ser Leu Leu Ala Gln Leu Thr Met Val Ala Glu Asp Val
 295 300 305
 tcc gca caa aca ggc atc cca cgc tca ttg att gca gaa tct gaa ctc
 1075
 Ser Ala Gln Thr Gly Ile Pro Arg Ser Leu Ile Ala Glu Ser Glu Leu
 310 315 320 325
 aat gac ccc aag ttc gtt acc tcc cgc gag gcc ggc ggt ttt ggc ctg
 1123
 Asn Asp Pro Lys Phe Val Thr Ser Arg Glu Ala Gly Gly Phe Gly Leu
 330 335 340
 gat gca cag tgg gtt gac gat atc cac cac gcc ctc cat gcc ctc gtt
 1171
 Asp Ala Gln Trp Val Asp Asp Ile His His Ala Leu His Ala Leu Val
 345 350 355
 tct ggc gaa cgc aat ggt tat tac agc gat ttc gga tct gtc gac aca
 1219
 Ser Gly Glu Arg Asn Gly Tyr Tyr Ser Asp Phe Gly Ser Val Asp Thr
 360 365 370
 tta gcc aaa acc ctg cgt gaa gta ttt gaa cac acc gga aac tac tcc
 1267
 Leu Ala Lys Thr Leu Arg Glu Val Phe Glu His Thr Gly Asn Tyr Ser
 375 380 385

gag ctg att tac agc ttc act tcc ccc acc gtc acc gac acc tcc aca
1891

Glu Leu Ile Tyr Ser Phe Thr Ser Pro Thr Val Thr Asp Thr Ser Thr
585 590 595

acc ctt cag ccg tgg ggc ttt gcg atc ctg acc cga aac tagaaaaagg
1940

Thr Leu Gln Pro Trp Gly Phe Ala Ile Leu Thr Arg Asn
600 605 610

ccacacctgat tga
1953

<210> 1146

<211> 610

<212> PRT

<213> Corynebacterium glutamicum

<400> 1146

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Cys His Ser Ile Ser His Leu Ser Ser Pro Thr Gly Ser Ile Phe Thr
20 25 30

Ser Leu Val Ala Met Leu Thr Ser Gln Ser Phe Ser Val Trp Ala Pro
35 40 45

Leu Pro His Asp Val His Leu Ile Leu Asn Gly Glu Thr Leu Pro Met
50 55 60

His Lys Thr Glu Gly Ser Trp Trp Arg Ala Glu Ile Ala Pro Lys Ala
65 70 75 80

Gly Asp Arg Tyr Gly Phe Ser Leu Phe Asp Gly Ser Ser Trp Ser Lys
85 90 95

Thr Leu Pro Asp Pro Arg Ser Thr Ser Gln Pro Asp Gly Val His Gly
100 105 110

Leu Ser Glu Val Ser Asp Asp Ser Tyr Leu Trp Gly Asp Gln Gln Trp
115 120 125

Thr Gly Arg Ile Leu Pro Gly Ser Val Leu Tyr Glu Leu His Val Gly
130 135 140

Thr Phe Ser Glu Asp Gly Thr Phe Glu Gly Val Val Asp Lys Leu Pro
145 150 155 160

Tyr Leu Arg Asp Leu Gly Val Thr Ala Ile Glu Leu Leu Pro Val Gln
165 170 175

Pro Phe Gly Gly Asn Arg Asn Trp Gly Tyr Asp Gly Val Leu Trp His
180 185 190

Ala Val His Ala Gly Tyr Gly Pro Ala Gly Leu Lys Lys Leu Ile
195 200 205

Asp Ala Ser His Gln Ala Gly Ile Ala Val Tyr Leu Asp Val Val Tyr
210 215 220

acg tac cgc gga cgc aac cac ggc cgc cct gtg cac ccc gat atc acc
 1315
 Thr Tyr Arg Gly Arg Asn His Gly Arg Pro Val His Pro Asp Ile Thr
 390 395 400 405

 cct gcc tcg cgc ttt gtc acc tac acc acc acc cat gat cag acc ggc
 1363
 Pro Ala Ser Arg Phe Val Thr Tyr Thr Thr His Asp Gln Thr Gly
 410 415 420

 aac cgc gca atc ggc gac cgt cct tcc acg act ctc acc ccg gaa cag
 1411
 Asn Arg Ala Ile Gly Asp Arg Pro Ser Thr Thr Leu Thr Pro Glu Gln
 425 430 435

 cag gtg ttg aag gca gcc att atc tac agc tcg ccg tat acc ccg atg
 1459
 Gln Val Leu Lys Ala Ala Ile Ile Tyr Ser Ser Pro Tyr Thr Pro Met
 440 445 450

 ttg ttt atg ggt gaa gaa ttc gga gcc acc acc cca ttc gcc ttc ttt
 1507
 Leu Phe Met Gly Glu Glu Phe Gly Ala Thr Thr Pro Phe Ala Phe Phe
 455 460 465

 tgc tcc cac acc gac ccc gag ctc aac cgg cta acc tcc gag ggc cgc
 1555
 Cys Ser His Thr Asp Pro Glu Leu Asn Arg Leu Thr Ser Glu Gly Arg
 470 475 480 485

 aaa cgg gaa ttc gca cgc ctt ggc tgg aac gcc gac gac atc ccc tcc
 1603
 Lys Arg Glu Phe Ala Arg Leu Gly Trp Asn Ala Asp Asp Ile Pro Ser
 490 495 500

 ccc gag ctg gaa tcc acc ttc acc tcc tcc aaa ctc gat tgg gag ttc
 1651
 Pro Glu Leu Glu Ser Thr Phe Thr Ser Ser Lys Leu Asp Trp Glu Phe
 505 510 515

 act gcg gag cag cgc cgc atc aac gac gct tac aag cag ctg ttg cac
 1699
 Thr Ala Glu Gln Arg Arg Ile Asn Asp Ala Tyr Lys Gln Leu Leu His
 520 525 530

 ctg cgg cac acc ttg ggc ttc tcc caa cca aac ttg ctc aca ctc gag
 1747
 Leu Arg His Thr Leu Gly Phe Ser Gln Pro Asn Leu Leu Thr Leu Glu
 535 540 545

 gtt gag cac ggc gag aac tgg cta tcg atg gcc aat ggt cgc ggc cga
 1795
 Val Glu His Gly Glu Asn Trp Leu Ser Met Ala Asn Gly Arg Gly Arg
 550 555 560 565

 att ctg gcg aat ttc tcc gac gac acc atc acc gtc ccg ctt ggc ggc
 1843
 Ile Leu Ala Asn Phe Ser Asp Asp Thr Ile Thr Val Pro Leu Gly Gly
 570 575 580

Asn His Phe Gly Pro Asp Gly Asn Tyr Asn Gly Gln Phe Gly Pro Tyr
 225 230 235 240
 Thr Ser Gly Gly Ser Thr Gly Trp Gly Asp Val Val Asn Ile Asn Gly
 245 250 255
 His Asp Ser Asp Glu Val Arg Asn Tyr Ile Leu Asp Ala Ala Arg Gln
 260 265 270
 Trp Phe Glu Asp Phe His Val Asp Gly Leu Arg Leu Asp Ala Val His
 275 280 285
 Ser Leu Asp Asp Arg Gly Ala Tyr Ser Leu Leu Ala Gln Leu Thr Met
 290 295 300
 Val Ala Glu Asp Val Ser Ala Gln Thr Gly Ile Pro Arg Ser Leu Ile
 305 310 315 320
 Ala Glu Ser Glu Leu Asn Asp Pro Lys Phe Val Thr Ser Arg Glu Ala
 325 330 335
 Gly Gly Phe Gly Leu Asp Ala Gln Trp Val Asp Asp Ile His His Ala
 340 345 350
 Leu His Ala Leu Val Ser Gly Glu Arg Asn Gly Tyr Tyr Ser Asp Phe
 355 360 365
 Gly Ser Val Asp Thr Leu Ala Lys Thr Leu Arg Glu Val Phe Glu His
 370 375 380
 Thr Gly Asn Tyr Ser Thr Tyr Arg Gly Arg Asn His Gly Arg Pro Val
 385 390 395 400
 His Pro Asp Ile Thr Pro Ala Ser Arg Phe Val Thr Tyr Thr Thr
 405 410 415
 His Asp Gln Thr Gly Asn Arg Ala Ile Gly Asp Arg Pro Ser Thr Thr
 420 425 430
 Leu Thr Pro Glu Gln Gln Val Leu Lys Ala Ala Ile Ile Tyr Ser Ser
 435 440 445
 Pro Tyr Thr Pro Met Leu Phe Met Gly Glu Glu Phe Gly Ala Thr Thr
 450 455 460
 Pro Phe Ala Phe Phe Cys Ser His Thr Asp Pro Glu Leu Asn Arg Leu
 465 470 475 480
 Thr Ser Glu Gly Arg Lys Arg Glu Phe Ala Arg Leu Gly Trp Asn Ala
 485 490 495
 Asp Asp Ile Pro Ser Pro Glu Leu Glu Ser Thr Phe Thr Ser Ser Lys
 500 505 510
 Leu Asp Trp Glu Phe Thr Ala Glu Gln Arg Arg Ile Asn Asp Ala Tyr
 515 520 525
 Lys Gln Leu Leu His Leu Arg His Thr Leu Gly Phe Ser Gln Pro Asn
 530 535 540

Leu Leu Thr Leu Glu Val Glu His Gly Glu Asn Trp Leu Ser Met Ala
 545 550 555 560

Asn Gly Arg Gly Arg Ile Leu Ala Asn Phe Ser Asp Asp Thr Ile Thr
 565 570 575

Val Pro Leu Gly Gly Glu Leu Ile Tyr Ser Phe Thr Ser Pro Thr Val
 580 585 590

Thr Asp Thr Ser Thr Leu Gln Pro Trp Gly Phe Ala Ile Leu Thr
 595 600 605

Arg Asn
 610

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<211> 832

<212> DNA

<213> Corynebacterium glutamicum

<220>

<221> CDS

<222> (101)..(832)

<223> RXN02355

<400> 1147

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 Met Ser Ser Ile Ser
 1 5

cgc aag acc ggc gcg tca ctt gca gcc acc aca ctg ttg gca gcg atc 163
 Arg Lys Thr Gly Ala Ser Leu Ala Ala Thr Thr Leu Leu Ala Ala Ile
 10 15 20

gca ctg gcc ggt tgt agt tca gac tca agc tcc gac tcc aca gat tcc 211
 Ala Leu Ala Gly Cys Ser Ser Asp Ser Ser Asp Ser Thr Asp Ser
 25 30 35

acc gct agc gaa ggc gca gac agc cgc ggc ccc atc acc ttt gcg atg 259
 Thr Ala Ser Glu Gly Ala Asp Ser Arg Gly Pro Ile Thr Phe Ala Met
 40 45 50

ggc aaa aac gac acc gac aaa gtc att ccg atc atc gac cgc tgg aac 307
 Gly Lys Asn Asp Thr Asp Lys Val Ile Pro Ile Ile Asp Arg Trp Asn
 55 60 65

gaa gcc cac ccc gat gag cag gta acg ctc aac gaa ctc gcc ggt gaa 355
 Glu Ala His Pro Asp Glu Gln Val Thr Leu Asn Glu Leu Ala Gly Glu
 70 75 80 85

gcc gac gcg cag cgc gaa acc ctc gtgcaa tcc ctg cag gcc ggc aac 403
 Ala Asp Ala Gln Arg Glu Thr Leu Val Gln Ser Leu Gln Ala Gly Asn
 90 95 100

tct gac tac gac gtc atg gcg ctc gac gtc atc tgg acc gca gac ttc 451
 Ser Asp Tyr Asp Val Met Ala Leu Asp Val Ile Trp Thr Ala Asp Phe
 105 110 115

| | |
|---|-----|
| gct gca aac caa tgg ctc gca cca ctt gaa ggc gac ctc gag gta gac | 499 |
| Ala Ala Asn Gln Trp Leu Ala Pro Leu Glu Gly Asp Leu Glu Val Asp | |
| 120 125 130 | |
| acc tcc gga ctg ctg caa tcc acc gtg gat tcc gca acc tac aac ggc | 547 |
| Thr Ser Gly Leu Leu Gln Ser Thr Val Asp Ser Ala Thr Tyr Asn Gly | |
| 135 140 145 | |
| acc ctc tac gca ctg cca cag aac acc aac ggc cag cta ctg ttc cgc | 595 |
| Thr Leu Tyr Ala Leu Pro Gln Asn Thr Asn Gly Gln Leu Leu Phe Arg | |
| 150 155 160 165 | |
| aac acc gaa atc atc cca gaa gca cca gca aac tgg gct gac ctc gtg | 643 |
| Asn Thr Glu Ile Ile Pro Glu Ala Pro Ala Asn Trp Ala Asp Leu Val | |
| 170 175 180 | |
| gaa tcc tgc acg ctt gct gaa gaa gca ggc gtt gat tgc ctg acc act | 691 |
| Glu Ser Cys Thr Leu Ala Glu Ala Gly Val Asp Cys Leu Thr Thr | |
| 185 190 195 | |
| cag ctc aag cag tac gaa ggc ctt tca gtg aac acc atc ggc ttc atc | 739 |
| Gln Leu Lys Gln Tyr Glu Gly Leu Ser Val Asn Thr Ile Gly Phe Ile | |
| 200 205 210 | |
| gaa ggt tgg gga ggc agc gtc cta gac gat gac ggc aaa cgt cac cgt | 787 |
| Glu Gly Trp Gly Ser Val Leu Asp Asp Gly Lys Arg His Arg | |
| 215 220 225 | |
| aga cag cac gac ggc aag gca ggc ctt caa gcg ctt gtc gac ggc | 832 |
| Arg Gln His Asp Gly Lys Ala Gly Leu Gln Ala Leu Val Asp Gly | |
| 230 235 240 | |

<210> 1148

<211> 244

<212> PRT

<213> Corynebacterium glutamicum

<400> 1148

| | |
|---|--|
| Met Ser Ser Ile Ser Arg Lys Thr Gly Ala Ser Leu Ala Ala Thr Thr | |
| 1 5 10 15 | |

| | |
|---|--|
| Leu Leu Ala Ala Ile Ala Leu Ala Gly Cys Ser Ser Asp Ser Ser Ser | |
| 20 25 30 | |

| | |
|---|--|
| Asp Ser Thr Asp Ser Thr Ala Ser Glu Gly Ala Asp Ser Arg Gly Pro | |
| 35 40 45 | |

| | |
|---|--|
| Ile Thr Phe Ala Met Gly Lys Asn Asp Thr Asp Lys Val Ile Pro Ile | |
| 50 55 60 | |

| | |
|---|--|
| Ile Asp Arg Trp Asn Glu Ala His Pro Asp Glu Gln Val Thr Leu Asn | |
| 65 70 75 80 | |

| | |
|---|--|
| Glu Leu Ala Gly Glu Ala Asp Ala Gln Arg Glu Thr Leu Val Gln Ser | |
| 85 90 95 | |

| | |
|---|--|
| Leu Gln Ala Gly Asn Ser Asp Tyr Asp Val Met Ala Leu Asp Val Ile | |
| 100 105 110 | |

| | |
|---|--|
| Trp Thr Ala Asp Phe Ala Ala Asn Gln Trp Leu Ala Pro Leu Glu Gly | |
|---|--|

| | | |
|---|-----|-----|
| 115 | 120 | 125 |
| Asp Leu Glu Val Asp Thr Ser Gly Leu Leu Gln Ser Thr Val Asp Ser | | |
| 130 | 135 | 140 |
| Ala Thr Tyr Asn Gly Thr Leu Tyr Ala Leu Pro Gln Asn Thr Asn Gly | | |
| 145 | 150 | 155 |
| 160 | | |
| Gln Leu Leu Phe Arg Asn Thr Glu Ile Ile Pro Glu Ala Pro Ala Asn | | |
| 165 | 170 | 175 |
| Trp Ala Asp Leu Val Glu Ser Cys Thr Leu Ala Glu Glu Ala Gly Val | | |
| 180 | 185 | 190 |
| Asp Cys Leu Thr Thr Gln Leu Lys Gln Tyr Glu Gly Leu Ser Val Asn | | |
| 195 | 200 | 205 |
| Thr Ile Gly Phe Ile Glu Gly Trp Gly Gly Ser Val Leu Asp Asp Asp | | |
| 210 | 215 | 220 |
| Gly Lys Arg His Arg Arg Gln His Asp Gly Lys Ala Gly Leu Gln Ala | | |
| 225 | 230 | 235 |
| 240 | | |
| Leu Val Asp Gly | | |

<210> 1149
 <211> 609
 <212> DNA
 <213> Corynebacterium glutamicum

<220>
 <221> CDS
 <222> (101)..(586)
 <223> RXN02909

<400> 1149
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 atagttcct ggattgttg gcacagtcgg gagaaaaactc atg aac cgc gca cga 115
 Met Asn Arg Ala Arg
 1 5

atc gcg acc ata ggc gtt ctt ccg ctt gct tta ctg ctg gcg tcc tgt 163
 Ile Ala Thr Ile Gly Val Leu Pro Leu Ala Leu Leu Ala Ser Cys
 10 15 20

ggt tca gac acc gtg gaa atg aca gat tcc acc tgg ttg gtg acc aat 211
 Gly Ser Asp Thr Val Glu Met Thr Asp Ser Thr Trp Leu Val Thr Asn
 25 30 35

att tac acc gat cca gat gag tcg aat tcg atc agt aat ctt gtc att 259
 Ile Tyr Thr Asp Pro Asp Glu Ser Asn Ser Ile Ser Asn Leu Val Ile
 40 45 50

tcc cag ccc agc tta gat ttt ggc aat tct tcc ctg tct ggt ttc act 307
 Ser Gln Pro Ser Leu Asp Phe Gly Asn Ser Ser Leu Ser Gly Phe Thr
 55 60 65

ggc tgt gtg cct ttt acg ggg cgt gcg gaa ttc ttc caa aat ggt gag 355

| | | | |
|---|-----|-----|-----|
| Gly Cys Val Pro Phe Thr Gly Arg Ala Glu Phe Phe Gln Asn Gly Glu | | | |
| 70 | 75 | 80 | 85 |
| caa agc tct gtt ctg gat gcc gat tat gtg acc ttg tct tcc ctg gat | | | 403 |
| Gln Ser Ser Val Leu Asp Ala Asp Tyr Val Thr Leu Ser Ser Leu Asp | | | |
| 90 | 95 | 100 | |
| ttc gat aaa ctt ccc gat gat tgc caa gga caa gaa ctc aaa gtt cat | | | 451 |
| Phe Asp Lys Leu Pro Asp Asp Cys Gln Gly Gln Glu Leu Lys Val His | | | |
| 105 | 110 | 115 | |
| aac gag ctg gtt gat ctt ctg cct ggt tct ttt gaa atc tcc agg act | | | 499 |
| Asn Glu Leu Val Asp Leu Leu Pro Gly Ser Phe Glu Ile Ser Arg Thr | | | |
| 120 | 125 | 130 | |
| tct ggt tca gaa atc ttg ctg act agc gat gtc gat gaa ctc gat cgg | | | 547 |
| Ser Gly Ser Glu Ile Leu Leu Thr Ser Asp Val Asp Glu Leu Asp Arg | | | |
| 135 | 140 | 145 | |
| cca gca atc cgc ttg gtg tcc tgg atc gcg ccg aca tct taaggtgccaa | | | 596 |
| Pro Ala Ile Arg Leu Val Ser Trp Ile Ala Pro Thr Ser | | | |
| 150 | 155 | 160 | |
| gggctttaaa gtg | | | 609 |

<210> 1150

<211> 162

<212> PRT

<213> Corynebacterium glutamicum

<400> 1150

| | | | |
|---|---|----|----|
| Met Asn Arg Ala Arg Ile Ala Thr Ile Gly Val Leu Pro Leu Ala Leu | | | |
| 1 | 5 | 10 | 15 |

| | | |
|---|----|----|
| Leu Leu Ala Ser Cys Gly Ser Asp Thr Val Glu Met Thr Asp Ser Thr | | |
| 20 | 25 | 30 |

| | | |
|---|----|----|
| Trp Leu Val Thr Asn Ile Tyr Thr Asp Pro Asp Glu Ser Asn Ser Ile | | |
| 35 | 40 | 45 |

| | | |
|---|----|----|
| Ser Asn Leu Val Ile Ser Gln Pro Ser Leu Asp Phe Gly Asn Ser Ser | | |
| 50 | 55 | 60 |

| | | | |
|---|----|----|----|
| Leu Ser Gly Phe Thr Gly Cys Val Pro Phe Thr Gly Arg Ala Glu Phe | | | |
| 65 | 70 | 75 | 80 |

| | | |
|---|----|----|
| Phe Gln Asn Gly Glu Gln Ser Ser Val Leu Asp Ala Asp Tyr Val Thr | | |
| 85 | 90 | 95 |

| | | |
|---|-----|-----|
| Leu Ser Ser Leu Asp Phe Asp Lys Leu Pro Asp Asp Cys Gln Gly Gln | | |
| 100 | 105 | 110 |

| | | |
|---|-----|-----|
| Glu Leu Lys Val His Asn Glu Leu Val Asp Leu Leu Pro Gly Ser Phe | | |
| 115 | 120 | 125 |

| | | |
|---|-----|-----|
| Glu Ile Ser Arg Thr Ser Gly Ser Glu Ile Leu Leu Thr Ser Asp Val | | |
| 130 | 135 | 140 |

| | | | |
|---|-----|-----|-----|
| Asp Glu Leu Asp Arg Pro Ala Ile Arg Leu Val Ser Trp Ile Ala Pro | | | |
| 145 | 150 | 155 | 160 |

Thr Ser

<210> 1151
 <211> 1590
 <212> DNA
 <213> *Corynebacterium glutamicum*

<220>
 <221> CDS
 <222> (101)..(1567)
 <223> RXS00349

<400> 1151
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 gtgattggac tcttttcct tgcaaaatgt tttccagcgg atg ttg agt ttt gcg 115
 Met Leu Ser Phe Ala
 1 5

acc ctt cgt ggc cgc att tca aca gtt gac gct gca aaa gcc gca cct 163
 Thr Leu Arg Gly Arg Ile Ser Thr Val Asp Ala Ala Lys Ala Ala Pro
 10 15 20

ccg cca tcg cca cta gcc ccg att gat ctc act gac cat agt caa gtg 211
 Pro Pro Ser Pro Leu Ala Pro Ile Asp Leu Thr Asp His Ser Gln Val
 25 30 35

gcc ggt gtg atg aat ttg gct gcg aga att ggc gat att ttg ctt tct 259
 Ala Gly Val Met Asn Leu Ala Ala Arg Ile Gly Asp Ile Leu Leu Ser
 40 45 50

tca ggt acg tca aat agt gac acc aag gta caa gtt cga gca gtg acc 307
 Ser Gly Thr Ser Asn Ser Asp Thr Lys Val Gln Val Arg Ala Val Thr
 55 60 65

tct gcg tac ggt ttg tac tac acg cac gtg gat atc acg ttg aat acg 355
 Ser Ala Tyr Gly Leu Tyr Tyr His Val Asp Ile Thr Leu Asn Thr
 70 75 80 85

atc acc atc ttc acc aac atc ggt gtg gag agg aag atg ccg gtc aac 403
 Ile Thr Ile Phe Thr Asn Ile Gly Val Glu Arg Lys Met Pro Val Asn
 90 95 100

gtg ttt cat gtt gta ggc aag ttg gac acc aac ttc tcc aaa ctg tct 451
 Val Phe His Val Val Gly Lys Leu Asp Thr Asn Phe Ser Lys Leu Ser
 105 110 115

gag gtt gac cgt ttg atc cgt tcc att cag gct ggt gcg acc ccg cct 499
 Glu Val Asp Arg Leu Ile Arg Ser Ile Gln Ala Gly Ala Thr Pro Pro
 120 125 130

gag gtt gcc gag aaa atc ctg gac gag ttg gag caa tcc cct gcg tct 547
 Glu Val Ala Glu Lys Ile Leu Asp Glu Leu Glu Gln Ser Pro Ala Ser
 135 140 145

tat ggt ttc cct gtt gcg ttg ctt ggc tgg gca atg atg ggt ggt gct 595
 Tyr Gly Phe Pro Val Ala Leu Leu Gly Trp Ala Met Met Gly Gly Ala
 150 155 160 165

| | |
|---|-----|
| gtt gct gtg ctg ttg ggt ggt gga tgg cag gtt tcc cta att gct ttt | 643 |
| Val Ala Val Leu Leu Gly Gly Trp Gln Val Ser Leu Ile Ala Phe | |
| 170 175 180 | |
| att acc gcg ttc acg atc att gcc acg acg tca ttt ttg gga aag aag | 691 |
| Ile Thr Ala Phe Thr Ile Ile Ala Thr Thr Ser Phe Leu Gly Lys Lys | |
| 185 190 195 | |
| ggt ttg cct act ttc ttc caa aat gtt gtt ggt ttt att gcc acg | 739 |
| Gly Leu Pro Thr Phe Phe Gln Asn Val Val Gly Gly Phe Ile Ala Thr | |
| 200 205 210 | |
| ctg cct gca tcg att gct tat tct ttg gcg ttg caa ttt ggt ctt gag | 787 |
| Leu Pro Ala Ser Ile Ala Tyr Ser Leu Ala Leu Gln Phe Gly Leu Glu | |
| 215 220 225 | |
| atc aaa ccg agc cag atc atc gca tct gga att gtt gtt ctg ttg gca | 835 |
| Ile Lys Pro Ser Gln Ile Ile Ala Ser Gly Ile Val Val Leu Leu Ala | |
| 230 235 240 245 | |
| ggt ttg aca ctc gtg caa tct ctg cag gac ggc atc acg ggc gct ccg | 883 |
| Gly Leu Thr Leu Val Gln Ser Leu Gln Asp Gly Ile Thr Gly Ala Pro | |
| 250 255 260 | |
| gtg aca gca agt gca cga ttt ttc gaa aca ctc ctg ttt acc ggc ggc | 931 |
| Val Thr Ala Ser Ala Arg Phe Phe Glu Thr Leu Leu Phe Thr Gly Gly | |
| 265 270 275 | |
| att gtt gct ggc gtg ggt ttg ggc att cag ctt tct gaa atc ttg cat | 979 |
| Ile Val Ala Gly Val Gly Leu Gly Ile Gln Leu Ser Glu Ile Leu His | |
| 280 285 290 | |
| gtc atg ttg cct gcc atg gag tcc gct gca gca cct aat tat tcg tct | |
| 1027 | |
| Val Met Leu Pro Ala Met Glu Ser Ala Ala Ala Pro Asn Tyr Ser Ser | |
| 295 300 305 | |
| aca ttc gcc cgc att atc gct ggt ggc gtc acc gca gcg gcc ttc gca | |
| 1075 | |
| Thr Phe Ala Arg Ile Ile Ala Gly Gly Val Thr Ala Ala Ala Phe Ala | |
| 310 315 320 325 | |
| gtg ggt tgt tac gcg gag tgg tcc tcg gtg att att gcg ggg ctt act | |
| 1123 | |
| Val Gly Cys Tyr Ala Glu Trp Ser Ser Val Ile Ile Ala Gly Leu Thr | |
| 330 335 340 | |
| gcg ctg atg ggt tct gcg ttt tat tac ctc ttc gtt gtt tat tta ggc | |
| 1171 | |
| Ala Leu Met Gly Ser Ala Phe Tyr Tyr Leu Phe Val Val Tyr Leu Gly | |
| 345 350 355 | |
| ccc gtc tct gcc gct gcg att gct gca aca gca gtt ggt ttc act ggt | |
| 1219 | |
| Pro Val Ser Ala Ala Ala Ile Ala Ala Thr Ala Val Gly Phe Thr Gly | |
| 360 365 370 | |
| ggt ttg ctt gcc cgt cga ttc ttg att cca ccg ttg att gtg gcg att | |
| 1267 | |
| Gly Leu Leu Ala Arg Arg Phe Leu Ile Pro Pro Leu Ile Val Ala Ile | |

| | | | | | | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 375 | 380 | 385 | | | | | | | | | | | | | |
| gcc ggc atc aca cca atg ctt cca ggt cta gca att tac cgc gga atg | | | | | | | | | | | | | | | |
| 1315 | | | | | | | | | | | | | | | |
| Ala | Gly | Ile | Thr | Pro | Met | Leu | Pro | Gly | Leu | Ala | Ile | Tyr | Arg | Gly | Met |
| 390 | | | | 395 | | | | | 400 | | | | 405 | | |
| tac gcc acc ctg aat gat caa aca ctc atg ggt ttc acc aac att gcg | | | | | | | | | | | | | | | |
| 1363 | | | | | | | | | | | | | | | |
| Tyr | Ala | Thr | Leu | Asn | Asp | Gln | Thr | Leu | Met | Gly | Phe | Thr | Asn | Ile | Ala |
| | | | | | | | 410 | | 415 | | | | 420 | | |
| gtt gct tta gcc act gct tca tca ctt gcc gct ggc gtg gtt ttg ggt | | | | | | | | | | | | | | | |
| 1411 | | | | | | | | | | | | | | | |
| Val | Ala | Leu | Ala | Thr | Ala | Ser | Ser | Leu | Ala | Ala | Gly | Val | Val | Leu | Gly |
| | | | | | | | 425 | | 430 | | | | 435 | | |
| gag tgg att gcc cgc agg cta cgt cgt cca cca cgc ttc aac cca tac | | | | | | | | | | | | | | | |
| 1459 | | | | | | | | | | | | | | | |
| Glu | Trp | Ile | Ala | Arg | Arg | Leu | Arg | Arg | Pro | Pro | Arg | Phe | Asn | Pro | Tyr |
| | | | | | | | 440 | | 445 | | | | 450 | | |
| cgt gca ttt acc aag gcg aat gag ttc tcc ttc cag gag gaa gct gag | | | | | | | | | | | | | | | |
| 1507 | | | | | | | | | | | | | | | |
| Arg | Ala | Phe | Thr | Lys | Ala | Asn | Glu | Phe | Ser | Phe | Gln | Glu | Glu | Ala | Glu |
| | | | | | | | 455 | | 460 | | | | 465 | | |
| cag aat cag cgc cgg cag aga aaa cgt cca aag act aat cag aga ttc | | | | | | | | | | | | | | | |
| 1555 | | | | | | | | | | | | | | | |
| Gln | Asn | Gln | Arg | Arg | Gln | Arg | Lys | Arg | Pro | Lys | Thr | Asn | Gln | Arg | Phe |
| | | | | | | | 470 | | 475 | | | | 480 | | 485 |
| ggt aat aaa agg taaaaatcaa cctgcttagg cgt | | | | | | | | | | | | | | | |
| 1590 | | | | | | | | | | | | | | | |
| Gly | Asn | Lys | Arg | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <210> | 1152 | | | | | | | | | | | | | | |
| <211> | 489 | | | | | | | | | | | | | | |
| <212> | PRT | | | | | | | | | | | | | | |
| <213> | Corynebacterium glutamicum | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| <400> | 1152 | | | | | | | | | | | | | | |
| Met | Leu | Ser | Phe | Ala | Thr | Leu | Arg | Gly | Arg | Ile | Ser | Thr | Val | Asp | Ala |
| 1 | | | | 5 | | | | | 10 | | | | 15 | | |
| Ala Lys Ala Ala Pro Pro Pro Ser Pro Leu Ala Pro Ile Asp Leu Thr | | | | | | | | | | | | | | | |
| | | | | | | | | | | 20 | | 25 | | 30 | |
| Asp His Ser Gln Val Ala Gly Val Met Asn Leu Ala Ala Arg Ile Gly | | | | | | | | | | | | | | | |
| | | | | | | | | | | 35 | | 40 | | 45 | |
| Asp Ile Leu Leu Ser Ser Gly Thr Ser Asn Ser Asp Thr Lys Val Gln | | | | | | | | | | | | | | | |
| | | | | | | | | | | 50 | | 55 | | 60 | |
| Val Arg Ala Val Thr Ser Ala Tyr Gly Leu Tyr Tyr Thr His Val Asp | | | | | | | | | | | | | | | |
| | | | | | | | | | | 65 | | 70 | | 75 | |
| Ile Thr Leu Asn Thr Ile Thr Ile Phe Thr Asn Ile Gly Val Glu Arg | | | | | | | | | | | | | | | |
| | | | | | | | | | | 85 | | 90 | | 95 | |

Lys Met Pro Val Asn Val Phe His Val Val Gly Lys Leu Asp Thr Asn
 100 105 110
 Phe Ser Lys Leu Ser Glu Val Asp Arg Leu Ile Arg Ser Ile Gln Ala
 115 120 125
 Gly Ala Thr Pro Pro Glu Val Ala Glu Lys Ile Leu Asp Glu Leu Glu
 130 135 140
 Gln Ser Pro Ala Ser Tyr Gly Phe Pro Val Ala Leu Leu Gly Trp Ala
 145 150 155 160
 Met Met Gly Gly Ala Val Ala Val Leu Leu Gly Gly Trp Gln Val
 165 170 175
 Ser Leu Ile Ala Phe Ile Thr Ala Phe Thr Ile Ile Ala Thr Thr Ser
 180 185 190
 Phe Leu Gly Lys Lys Gly Leu Pro Thr Phe Phe Gln Asn Val Val Gly
 195 200 205
 Gly Phe Ile Ala Thr Leu Pro Ala Ser Ile Ala Tyr Ser Leu Ala Leu
 210 215 220
 Gln Phe Gly Leu Glu Ile Lys Pro Ser Gln Ile Ile Ala Ser Gly Ile
 225 230 235 240
 Val Val Leu Leu Ala Gly Leu Thr Leu Val Gln Ser Leu Gln Asp Gly
 245 250 255
 Ile Thr Gly Ala Pro Val Thr Ala Ser Ala Arg Phe Phe Glu Thr Leu
 260 265 270
 Leu Phe Thr Gly Gly Ile Val Ala Gly Val Gly Leu Gly Ile Gln Leu
 275 280 285
 Ser Glu Ile Leu His Val Met Leu Pro Ala Met Glu Ser Ala Ala Ala
 290 295 300
 Pro Asn Tyr Ser Ser Thr Phe Ala Arg Ile Ile Ala Gly Gly Val Thr
 305 310 315 320
 Ala Ala Ala Phe Ala Val Gly Cys Tyr Ala Glu Trp Ser Ser Val Ile
 325 330 335
 Ile Ala Gly Leu Thr Ala Leu Met Gly Ser Ala Phe Tyr Tyr Leu Phe
 340 345 350
 Val Val Tyr Leu Gly Pro Val Ser Ala Ala Ala Ile Ala Ala Thr Ala
 355 360 365
 Val Gly Phe Thr Gly Gly Leu Leu Ala Arg Arg Phe Leu Ile Pro Pro
 370 375 380
 Leu Ile Val Ala Ile Ala Gly Ile Thr Pro Met Leu Pro Gly Leu Ala
 385 390 395 400
 Ile Tyr Arg Gly Met Tyr Ala Thr Leu Asn Asp Gln Thr Leu Met Gly
 405 410 415

Phe Thr Asn Ile Ala Val Ala Leu Ala Thr Ala Ser Ser Leu Ala Ala
 420 425 430

Gly Val Val Leu Gly Glu Trp Ile Ala Arg Arg Leu Arg Arg Pro Pro
 435 440 445

Arg Phe Asn Pro Tyr Arg Ala Phe Thr Lys Ala Asn Glu Phe Ser Phe
 450 455 460

Gln Glu Glu Ala Glu Gln Asn Gln Arg Arg Gln Arg Lys Arg Pro Lys
 465 470 475 480

Thr Asn Gln Arg Phe Gly Asn Lys Arg
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<210> 1153

<211> 440

<212> DNA

<213> *Corynebacterium glutamicum*

<220>

<221> CDS

<222> (1)..(417)

<223> RXS03183

<400> 1153

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 Glu Ala Glu Ala Thr Ala Gly Lys Phe Glu Val Gln Pro Leu Val Gly
 1 5 10 15

aaa gac ggc gtc ggc gta tcc acc ctt ggt ggc tac aac aac ggc atc 96
 Lys Asp Gly Val Gly Val Ser Thr Leu Gly Gly Tyr Asn Asn Gly Ile
 20 25 30

aac gtc aac tcc gaa aac aag gca acc gcc cgc gac ttc atc gaa ttc 144
 Asn Val Asn Ser Glu Asn Lys Ala Thr Ala Arg Asp Phe Ile Glu Phe
 35 40 45

atc atc aac gaa gag aac caa acc tgg ttc gcg gac aac tcc ttc cca 192
 Ile Ile Asn Glu Glu Asn Gln Thr Trp Phe Ala Asp Asn Ser Phe Pro
 50 55 60

cca gtt ctg gca tcc atc tac gat gat gag tcc ctt gtt gag cag tac 240
 Pro Val Leu Ala Ser Ile Tyr Asp Asp Glu Ser Leu Val Glu Gln Tyr
 65 70 75 80

cca tac ctg cca gca ctg aag gaa tcc ctg gaa aac gca gca cca cgc 288
 Pro Tyr Leu Pro Ala Leu Lys Glu Ser Leu Glu Asn Ala Ala Pro Arg
 85 90 95

cca gtg tct cct ttc tac cca gcc atc tcc aag gca atc cag gac aac 336
 Pro Val Ser Pro Phe Tyr Pro Ala Ile Ser Lys Ala Ile Gln Asp Asn
 100 105 110

gcc tac gca gcg ctt aac ggc aac gtc gac gtt gac cag gca acc acc 384
 Ala Tyr Ala Ala Leu Asn Gly Asn Val Asp Val Asp Gln Ala Thr Thr
 115 120 125

gat atg aag gca gcg atc gaa aac gct tcc agc tagtcggta atttagttca 437
 Asp Met Lys Ala Ala Ile Glu Asn Ala Ser Ser

130

135

ttc

440

<210> 1154

<211> 139

<212> PRT

<213> Corynebacterium glutamicum

<400> 1154

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Glu | Ala | Glu | Ala | Thr | Ala | Gly | Lys | Phe | Glu | Val | Gln | Pro | Leu | Val | Gly |
| 1 | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lys | Asp | Gly | Val | Gly | Val | Ser | Thr | Leu | Gly | Gly | Tyr | Asn | Asn | Gly | Ile |
| | | | | | | | | | | | | | | | |
| 20 | | | | | | | | 25 | | | | | | | 30 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Val | Asn | Ser | Glu | Asn | Lys | Ala | Thr | Ala | Arg | Asp | Phe | Ile | Glu | Phe |
| | | | | | | | | | | | | | | | |
| 35 | | | | | | | 40 | | | | | | | | 45 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Ile | Asn | Glu | Glu | Asn | Gln | Thr | Trp | Phe | Ala | Asp | Asn | Ser | Phe | Pro |
| | | | | | | | | | | | | | | | |
| 50 | | | | | | | 55 | | | | | | | | 60 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Val | Leu | Ala | Ser | Ile | Tyr | Asp | Asp | Glu | Ser | Leu | Val | Glu | Gln | Tyr |
| | | | | | | | | | | | | | | | |
| 65 | | | | | | | 70 | | | | 75 | | | | 80 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Tyr | Leu | Pro | Ala | Leu | Lys | Glu | Ser | Leu | Glu | Asn | Ala | Ala | Pro | Arg |
| | | | | | | | | | | | | | | | |
| 85 | | | | | | | | 90 | | | | | | | 95 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Val | Ser | Pro | Phe | Tyr | Pro | Ala | Ile | Ser | Lys | Ala | Ile | Gln | Asp | Asn |
| | | | | | | | | | | | | | | | |
| 100 | | | | | | | | 105 | | | | | | | 110 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Tyr | Ala | Ala | Leu | Asn | Gly | Asn | Val | Asp | Val | Asp | Gln | Ala | Thr | Thr |
| | | | | | | | | | | | | | | | |
| 115 | | | | | | | | 120 | | | | | | | 125 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|--|
| Asp | Met | Lys | Ala | Ala | Ile | Glu | Asn | Ala | Ser | Ser | | | | | |
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| tctggtttga | tctcaccgccc | gatgaaaagg | acgatatgga | atg | agc | att | ggc | caa | | | | | | | 115 |
| | | | | | | | | | Met | Ser | Ile | Gly | Gln | | |
| | | | | | | | | | 1 | | | | | | 5 |

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| cac | atc | atc | acc | gag | cgt | ttc | tac | ggc | gcc | aag | tcc | cac | acc | atc | gac | | 163 |
| His | Ile | Ile | Thr | Glu | Arg | Phe | Tyr | Gly | Ala | Lys | Ser | His | Thr | Ile | Asp | | |
| | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | 15 | | | | | | 20 | |

aac gta gat att gtg ttg tcc cgc gaa tgt ggc gag aac act ttg gct 211

| | | | |
|---|-----|-----|-----|
| Asn Val Asp Ile Val Leu Ser Arg Glu Cys Gly Glu Asn Thr Leu Ala | | | |
| 25 | 30 | 35 | |
| gta gtg cgc atc aac aat gcg ctg tat cag ttg ttg gtc aat gat gat | | 259 | |
| Val Val Arg Ile Asn Asn Ala Leu Tyr Gln Leu Leu Val Asn Asp Asp | | | |
| 40 | 45 | 50 | |
| ggc aaa gat gtt ctc aac gac cac gta gaa gag gtc ggt gcg agt ttc | | 307 | |
| Gly Lys Asp Val Leu Asn Asp His Val Glu Glu Val Gly Ala Ser Phe | | | |
| 55 | 60 | 65 | |
| gga gca tgg act ggc agc tct gct ttt ccc att ggc cct ttc act cca | | 355 | |
| Gly Ala Trp Thr Gly Ser Ser Ala Phe Pro Ile Gly Pro Phe Thr Pro | | | |
| 70 | 75 | 80 | 85 |
| ctc ggc aca gaa caa tcc aat agc tct ttc atc acc gcc gac aat aaa | | 403 | |
| Leu Gly Thr Glu Gln Ser Asn Ser Phe Ile Thr Ala Asp Asn Lys | | | |
| 90 | 95 | 100 | |
| gcg atc gtg aaa tac ttc cgc aaa tta gaa tcc ggg caa aac ccc gat | | 451 | |
| Ala Ile Val Lys Tyr Phe Arg Lys Leu Glu Ser Gly Gln Asn Pro Asp | | | |
| 105 | 110 | 115 | |
| gtg gag cta att tct aaa att tcc tcc tgc ccc aac atc gcg ccc atc | | 499 | |
| Val Glu Leu Ile Ser Lys Ile Ser Ser Cys Pro Asn Ile Ala Pro Ile | | | |
| 120 | 125 | 130 | |
| ctg ggt ttt tcc tcc gct gag atc tcc ggg gct aac tac acc ctg gtc | | 547 | |
| Leu Gly Phe Ser Ser Ala Glu Ile Ser Gly Ala Asn Tyr Thr Leu Val | | | |
| 135 | 140 | 145 | |
| atg gcg cag cag tac gtt cca ggt ttg gat ggc tgg tca cac gcg ctg | | 595 | |
| Met Ala Gln Gln Tyr Val Pro Gly Leu Asp Gly Trp Ser His Ala Leu | | | |
| 150 | 155 | 160 | 165 |
| act act acc tct ggc agc ttt gca gag gat gca gaa aag atc ggc gaa | | 643 | |
| Thr Thr Ser Gly Ser Phe Ala Glu Asp Ala Glu Lys Ile Gly Glu | | | |
| 170 | 175 | 180 | |
| gcc acc cgc aat gtt cac act gct ctt gca tcg gcc ttc cct act cgg | | 691 | |
| Ala Thr Arg Asn Val His Thr Ala Leu Ala Ser Ala Phe Pro Thr Arg | | | |
| 185 | 190 | 195 | |
| gta gtt ccc gta gaa gca ctc gcc gat gcg ctc act acc cgc ctt aat | | 739 | |
| Val Val Pro Val Glu Ala Leu Ala Asp Ala Leu Thr Thr Arg Leu Asn | | | |
| 200 | 205 | 210 | |
| gaa cta atc tcc caa gca ccc gaa atc gcc cgc ttc aaa gaa gca gcc | | 787 | |
| Glu Leu Ile Ser Gln Ala Pro Glu Ile Ala Arg Phe Lys Glu Ala Ala | | | |
| 215 | 220 | 225 | |
| atc gac ctc tac caa tcg ttg gaa ggc gaa gcc cac atc caa cgc atc | | 835 | |
| Ile Asp Leu Tyr Gln Ser Leu Glu Gly Glu Ala His Ile Gln Arg Ile | | | |
| 230 | 235 | 240 | 245 |
| cac ggt gac ctc cac ttg ggg cag ctc atc aaa acc ccc gaa cgc tac | | 883 | |
| His Gly Asp Leu His Leu Gly Gln Leu Ile Lys Thr Pro Glu Arg Tyr | | | |
| 250 | 255 | 260 | |
| atc ctc atc gat ttc gaa ggc gaa cct gcc cgc cca ctt aat caa cga | | 931 | |
| Ile Leu Ile Asp Phe Glu Gly Glu Pro Ala Arg Pro Leu Asn Gln Arg | | | |

265

270

275

cgc ctc ccc gac tct ccc ctg aaa gat ctc gcc ggc atc atc aga tcc 979
 Arg Leu Pro Asp Ser Pro Leu Lys Asp Leu Ala Gly Ile Ile Arg Ser
 280 285 290

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 Ile Asp Tyr Ala Ala Tyr Phe Asp Gly Glu His Thr Gln Trp Ala Asn
 295 300 305

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 Glu Ala Thr Ala Leu Phe Leu Asp Gly Tyr Gly Ser Ile Glu Asp Gln
 310 315 320 325

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 Glu Leu Leu Asn Ala Tyr Ile Leu Asp Lys Ala Leu Tyr Glu Val Ala
 330 335 340

tat gaa ata aac aac cgc ccc gac tgg gtc aac atc cca ctc gag gcg 1171
 Tyr Glu Ile Asn Asn Arg Pro Asp Trp Val Lys Ile Pro Leu Glu Ala
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 Val Glu Arg Leu Leu Asp
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Glu Asn Thr Leu Ala Val Val Arg Ile Asn Asn Ala Leu Tyr Gln Leu
 35 40 45

Leu Val Asn Asp Asp Gly Lys Asp Val Leu Asn Asp His Val Glu Glu
 50 55 60

Val Gly Ala Ser Phe Gly Ala Trp Thr Gly Ser Ser Ala Phe Pro Ile
 65 70 75 80

Gly Pro Phe Thr Pro Leu Gly Thr Glu Gln Ser Asn Ser Ser Phe Ile
 85 90 95

Thr Ala Asp Asn Lys Ala Ile Val Lys Tyr Phe Arg Lys Leu Glu Ser
 100 105 110

Gly Gln Asn Pro Asp Val Glu Leu Ile Ser Lys Ile Ser Ser Cys Pro
 115 120 125

Asn Ile Ala Pro Ile Leu Gly Phe Ser Ser Ala Glu Ile Ser Gly Ala
130 135 140

Asn Tyr Thr Leu Val Met Ala Gln Gln Tyr Val Pro Gly Leu Asp Gly
145 150 155 160

Trp Ser His Ala Leu Thr Thr Ser Gly Ser Phe Ala Glu Asp Ala
165 170 175

Glu Lys Ile Gly Glu Ala Thr Arg Asn Val His Thr Ala Leu Ala Ser
180 185 190

Ala Phe Pro Thr Arg Val Val Pro Val Glu Ala Leu Ala Asp Ala Leu
195 200 205

Thr Thr Arg Leu Asn Glu Leu Ile Ser Gln Ala Pro Glu Ile Ala Arg
210 215 220

Phe Lys Glu Ala Ala Ile Asp Leu Tyr Gln Ser Leu Glu Gly Glu Ala
225 230 235 240

His Ile Gln Arg Ile His Gly Asp Leu His Leu Gly Gln Leu Ile Lys
245 250 255

Thr Pro Glu Arg Tyr Ile Leu Ile Asp Phe Glu Gly Glu Pro Ala Arg
260 265 270

Pro Leu Asn Gln Arg Arg Leu Pro Asp Ser Pro Leu Lys Asp Leu Ala
275 280 285

Gly Ile Ile Arg Ser Ile Asp Tyr Ala Ala Tyr Phe Asp Gly Glu His
290 295 300

Thr Gln Trp Ala Asn Glu Ala Thr Ala Leu Phe Leu Asp Gly Tyr Gly
305 310 315 320

Ser Ile Glu Asp Gln Glu Leu Leu Asn Ala Tyr Ile Leu Asp Lys Ala
325 330 335

Leu Tyr Glu Val Ala Tyr Glu Ile Asn Asn Arg Pro Asp Trp Val Lys
340 345 350

Ile Pro Leu Glu Ala Val Glu Arg Leu Leu Asp
355 360